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Original Communications.

HYGIENIC THERAPEUTICS.

ON HYDROTHERAPY IN THE TREATMENT OF ACUTE AND FEBRILE MALADIES.*

By Professor Dujardin-Beaumetz, Paris, France.

GENTLEMEN :—I propose in this lecture to set forth the applications of hydrotherapy to the treatment of diseases which are acute and febrile. No question has given rise to more earnest and vehement discussions than this of the use of cold water as an antithermic agent. Extolled by some as the only means of allaying, and even of throttling, certain febrile diseases, condemned by those who consider it as useless and dangerous, the employment of cold water in the treatment of acute diseases, as I shall show you farther on when I come to speak of typhoid fever, has had its periods of popularity and decadence. But, in order that you may decide the value of arguments adduced for and against the use of cold water as an antithermic, I need, first of all, to state the physiological effects of cold when long continued.

When you keep for a certain length of time a warm-blooded animal in cold water, you re-

* Delivered in Cochin Hospital. Printed from advance sheets.

duce its temperature, and the fall is the more marked the colder the water and the longer the animal remains in the bath; on this point all experimenters are agreed. Physiologists have even studied the mechanism by which the economy struggles against agencies which tend to depress the temperature, and have demonstrated the important protective part played by the skin and the subjacent tissues.

In some carefully-conducted experiments, Mohammed-Effendi-Hafix has shown that under the influence of outward excitations the capillaries of the skin and those of the muscles do not behave in precisely the same way.* While the capillaries of the skin contract, and prevent the blood from coming to the surface, those of the muscles, on the contrary, keep their usual calibre, and even dilate, so that, as Scheuer observes,† the skin and subjacent tissues oppose to the loss of heat by the action of cold the three following impediments:

First, the contraction of the peripheral vascular net-work, which brings about a reduction in the quantity of blood circulating in contact with the frigorific agent; second, the transformation of the skin and its connective tissue, thus deprived of blood, into a medium which is a bad conductor of caloric; third, the subjacent layer of muscles now congested and engorged with blood, which forms a veritable insulating pad, and opposes the penetration of the outside cold.

But it is essential, in order that this harmonious aggregate of protective means shall come into play, that the skin shall preserve its sensibility; in fact, all these physiological processes are produced under reflex action. The cold acts on the skin, the sensation of cold is transmitted to the spinal axis and to the various vaso-motor centres therein contained, and thence is reflected on the vaso-motor nerves of the muscles and skin.

Let this chain be broken and all this harmonious play of self-preserving mechanism stops; the organism can no longer struggle against the external cold, and the animal succumbs with a progressive fall of the temperature. This it is that happens when the cold is too intense or too long continued, and the partial death of the part where the cold has been applied, or even its total death, is the consequence of this prolonged congelation.

But what is of especial importance for us in connection with the subject with which we are now occupied, is not to determine if, under the influence of cold, there is a fall in the temperature, but to know whether the production of heat is diminished in cases of this kind. I cannot here enter into all the details of this great question of thermogenesis. I have already several times touched upon this subject in my clinical therapeutic lectures and in my "New Medications."‡ I have endeavored to show that the danger from the hyperthermia does not so much result from the elevation of the temperature, as from the inordinate activity of the phenomena of combustion in the organism which produce this hyperthermia, and that what we want to combat is not so much the elevation of temperature in itself as the exaggeration of heat production. Let us, then, from this point of view, ask what are the results of the application of cold to the feverish organism.

The reply to this question was made several years ago by Frédéricq, of Liège, and is sufficiently conclusive. Frédéricq made use of the well-known apparatus of Regnault and Reisset, designed to further the study of the gases of respiration. He modified the apparatus so as to render it applicable to man, and showed that cold "when acting on the cutaneous surface of man augments manifestly the ratio of oxygen absorption and carbon dioxide production, and consequently of heat production.§ Instead, then, of slowing the interstitial combustions, cold powerfully excites this agency of thermogenesis." This authoritative view of the case has been completely confirmed by the recent experiments of my colleague and friend, Quinquaud.‖

Quinquaud, by precise experiments, has studied the action of cold and of heat on the chemical phenomena of nutrition. He first of all proved that, under the influence of cold baths, the absorption of oxygen augments. The following table shows this augmentation:

* Mohammed-Effendi-Hafix, "Ueber die Motorischen Nerven der Arterien welche ennerhalb der quergestreiflen Muskeln verlaufen" (*Bericht der Kgl. Sachs. Gesellsch. der Wissenschaften*, in Leipzig, 1870).

† Scheuer, "Essai sur l'action physiologique et thérapeutique de l'hydrothérapie." Paris, 1885, p. 125.

‡ Clinical Therapeutics, Am. ed., p. 354; New Medications (Detroit, 1886); also "New Antithermic Medication," THERAPEUTIC GAZETTE, 1887, p. 577.

§ Frédéricq, "On the Regulation of the Temperature in Warm-blooded Animals" (*Arch. Belg. de Biologie*, April, 1882).

‖ Quinquaud, *Journal d'Anatomie et de Physiologie*, tome iii., July and August, 1887.

Dates of experiments.	Temperature of bath.	Rectal temperature.		Oxygen absorbed in ten minutes.		Difference in the way of excess after bath.
		Before bath.	After bath.	Before bath.	After bath.	
March 8	6° C.	38° C.	32.5° C.	937 c.c.	1960 c.c.	1032 c.c.
March 5	6.8° C.	38° C.	33° C.	481 c.c.	4050 c.c.	3569 c.c.
May 4	12.5° C.	40.7° C.	30.3° C.	868.5 c.c.	1045 c.c.	176 c.c.
May 5	12.7° C.	39° C.	31.3° C.	1741 c.c.	2510 c.c.	769 c.c.

At the same time that the absorption of oxygen increases, the exhalation of carbonic acid also increases, as may be seen from the following table:

Dates of the experiments.	Temperature of bath.	Rectal temperature.		CO_2 exhaled in ten minutes.		Difference in excess after bath.
		Before bath.	After bath.	Before bath.	After bath.	
	Dogs.					
March 3	6° C.	39° C.	32.3° C.	2.50 g.	7.76 g.	5.60 g.
January 15	3.5° C.	39.1° C.	29.1° C.	1.52 g.	2.04 g.	0.52 g.
February 17	2 5° C.	39.1° C.	32.6° C.	2.12 g.	7.62 g.	5.50 g.
	Hares.					
February 22	4° C.	38.9° C.	36° C.	1.45 g.	1.80 g.	0.50 g.
December 27	5° C.	39.4° C.	28° C.	0.49 g.	0.62 g.	0.13 g.
January 13	5° C.,	39° C.	32.5° C.	0.55 g.	0.75 g.	0.20 g.
January 23	4.5° C.	38.1° C.	32 8° C.	0.64 g.	0 98 g.	0.34 g.

These facts, which were observed in animals, confirm those signalized by Frédéricq in the human subject. It must be understood that it will not do to let the rectal temperature fall below a given figure, and when it is reduced below 26° C. there is diminution in oxygen absorption and in carbonic acid exhalation.

Then, on studying simultaneously the influence of cold baths on the elementary nutrition, as measured by the aid of the simultaneous analysis of the gases of the arterial and venous blood, both of the surface and the right heart, Quinquaud arrives at this conclusion, that cold baths augment the activity of the interstitial combustions. Completing his researches by calorimetric studies, Quinquaud has lastly shown that the heat-units emitted in a given time increase under the influence of cold baths.

These experiments, so well conceived and so rigorously carried out, decide, then, the question from henceforth, and we are warranted in affirming, as a physiological law, that under the influence of cold baths the organic combustions are energized and augmented, on condition, always, that the refrigeration shall not overpass certain limits, and shall not result in a depression of the rectal temperature of the subject under experimentation below 30° C.

Cold water, then, acts as an antithermic, not by diminishing the combustions of the economy, but by abstracting heat from the individual. When we give a patient a cold bath, we are performing a physiological experiment similar to the experiments in calorimetry detailed above. We are bound to ask, when we propose to make clinical applications of cold baths to the treatment of fever, what real benefit the febricitant can obtain from this constant abstraction of heat, which obliges the organism to augment more and more the phenomena of internal combustion which the febrile state imposes.

I pass now to the examination of the application of cold baths and other hydrotherapic means to febrile complaints, and we shall have successively to consider the cold-water treatment of typhoid fever, of intermittent fever, of eruptive fevers, and, lastly, of acute febrile affections, such as pneumonia, pyemia, etc.

It is especially in combating typhus and typhoid fever that the refrigerant method has been employed. The application of cold in the treatment of typhoid fever is made in different ways,—sometimes use is made of cold baths or cold affusions; sometimes of lotions and wet wrappings; sometimes, however, the patient is put into a tepid bath.

We shall have successively to study under distinct heads each of these refrigerant methods. But I must first briefly allude to the different phases which the cold-water treatment of febrile maladies has gone through. I

need not repeat here what I have before said in my lecture on the history of hydrotherapy, and I shall simply take up the question of the usage of cold baths in typhoid fever from the time of Wright and Currie.

At the end of the last century (in 1797) appeared the work of Currie on the treatment of acute diseases by cold. Currie, by the help of his thermometer, had very attentively and scientifically studied the action of cold on febrile thermogenesis, and he drew favorable conclusions as to the utility of cold in the treatment of acute affections, and particularly of typhus. As I have already told you, he made use of affusions of cold water, or, rather, of salt water.

In 1805 appeared at Milan the work of Giannini,* who also, like Wright and Currie, treated continued fevers and intermittent fevers by cold water. But he abandoned affusions, and recommended immersions, and it may be truly said that Giannini is the real founder of the method to which Brand sixty years later was destined to attach his name.

That this is the fact is plain from the following passage from one of his writings: "I employ bath-tubs such as are in common use. I have them filled, as occasion requires, with cold water at the ordinary temperature of well water, and this in winter as well as in summer. The patient is carried by two properly qualified clinical attendants, and plunged naked into the water of the bath, in which he is kept sitting during the necessary time. When removed from the bath he is returned to his bed, after a partial and rather hasty rubbing with a dry cloth; a little moisture remaining on the person does no harm. Cold water is poured upon the head of the patient all the time he is in the bath."

Giannini thus treated what he called "nervous fever," which is only another name for typhoid fever, and he maintained, as did Brand at a later day, that this method not only cures "nervous fever," but diminishes its gravity; in a word, jugulates it. He fed his patients, and beside cold baths and the employment of suitable nourishment, he used no other mode of treatment.

In 1812 (ten years later), from a thesis published by a pupil of Récamier, Pavet de Courteille, we see that the physician of the Hôtel-Dieu applied the method of cold baths to the treatment of typhoid fever. The observation which relates to this fact is exceedingly instructive. The patient was a young girl, aged 12 years, attacked with "ataxo-adynamic fever." During each febrile paroxysm she was plunged for a quarter of an hour into a bath of from 20° to 22° C. (68° to 70° F.), and in the space of thirty-five days she received ninety baths. Ice was also applied to the head, and cold lavements were administered.

Ten years later (the scene is now changed to Germany), Hufeland proposed as the subject of a prize thesis *the treatment of fevers by cold water*. The prize, which was fifty ducats, was given to Froehlich. In his thesis Froehlich has collected thirty observations of acute affections treated by cold water. He has not forgotten to include ataxo-adynamic fever, and he claims that this method is applicable from the onset of the disease, not only cures it, but even abridges its course.

Scoutteten,† in a work which he published in 1843 descriptive of the practice of his master, Priessnitz, also calls attention to the use of cold water in the treatment of typhoid fever, and four cases are reported with full particulars.

Scoutteten and the physicians of the faculty of Strasbourg employed the hydrotherapic procedures of Priessnitz,—half baths, or partial baths, wet packs, sedative compresses, etc.

Four years later, in 1847, a physician of Haute-Saône, Jacquez,‡ of Lure, published the results of his experience in the treatment of typhoid fever by refrigerants. Persuaded of the necessity of abstracting heat from fever patients, Jacquez treated all his cases of typhoid fever by an exclusive method, which consisted in the free administration of cold water as a drink, and in applying over the body compresses wet with cold water and renewed every two hours. In fifteen years he thus treated three hundred and fifteen cases of typhoid fever, and lost but nineteen patients.

In 1852 appeared the work of Leroy, of Bethune, who, basing himself on an exact clinical observation,—to wit, that blood-letting depresses the temperature,—conjoined in the treatment of typhoid fever blood-letting with refrigeration by wet compresses,

* Giannini, "Della natura delle febri e del meglior methodo di curare." Milan, 1815, Traduction d'Heurteloup, 1808.

† Scoutteten, "On Water in its Hygienic and Medical Relations." Paris, 1843.

‡ Jacquez, "Statistical Researches on the Treatment of Typhoid Fever by Cold Water" (*Arch. Gén. de Méd.*, 1847, t. xiv.).

according to Jacquez's method. During the first week the blood-lettings predominated, then he had recourse to large cold compresses constantly renewed.

Then appeared in 1861 the first work of Brand, who, by the precision and rigorousness which he put into his method of refrigeration, has merited the right of associating his name with this mode of treatment of typhoid fever. Brand affirms that by this method, applied from the onset, one may expect to cure all his cases of typhoid fever, and thus virtually reduce to zero the mortality from typhus. He maintains that by cold baths you modify the grave forms of typhoid fever, and reduce all to a benign type.

This pretension of thus modifying the forms of typhoid fever you will find claimed by all who have devised exclusive and abortive systems, and from Currie and Giannini down to Pécholier the same end is sought. But, in order to arrive at this result, all the advocates of these exclusive and jugulating treatments insist that their methods shall be applied from the first day of the fever.

The works which Brand has published in defence of his method are numerous, appearing in regular order from 1861 to 1877.* At first Brand made use of affusions and of the partial half bath of Priessnitz, but in his later publications he abandons all these hydrotherapic applications, and substitutes for them the cold bath. The temperature of the patient must be taken every three hours, day and night, and whenever it is found above 39° C. (102° F.) the patient is plunged into a cold bath.

Adopted at first in a part of Germany, and particularly at Stettin, where Brand was practising, this method became popular throughout Germany, then spread to France under the influence of Glénard and the physicians of the Lyons School of Medicine.

Glénard, who was a prisoner at Stettin during a whole year of the late terrible war, had opportunities for judging respecting the advantages of the method of refrigeration as applied to typhoid fever, and when he returned to Lyons he set about putting in practice Brand's system, and in 1873 appeared his first publication† on the results which he had obtained therefrom. Since this date the various medical authorities of Lyons have successively given to the world precious documents to further the study of this question. I cannot here cite all these treatises, but I ought to make particular mention of the very complete work of Tripiér and Bouveret,‡ which contains very full statistics as to the treatment of typhoid fever by cold baths, and from which I have drawn valuable data for the preparation of this lecture.

The Medical Society of the Hospitals, then the Academy of Medicine, took up the discussion of this mode of treatment. The debate was earnest and vehement, and even characterized by passion. Since 1883, however, the question has been discussed with greater calmness, and latterly, save in Germany and in Lyons, the method of treatment of typhoid fever by cold baths seems to be virtually abandoned, and this chiefly in consequence of the discovery of those powerful antithermics which are obtained from the aromatic series, such as salicylic acid and antipyrin, which enable us almost at will to bring down the temperature of our fever patients.

This is the way that the method of refrigeration, according to Brand, is applied to the treatment of typhoid fever: I shall endeavor to be very precise in my description, for it has been made a reproach to physicians who have endeavored to carry out this treatment that they have not followed with all necessary rigorousness the precepts of the physician of Stettin.

Brand directs that the bath-tub shall be placed near the bed, a screen separating the two. The bath-tub contains a sufficient quantity of water, so that the patient when immersed in it shall be completely covered up to his neck. The temperature of the water should not exceed 20° C. (78° F.). Tripiér and Bouveret distinguished in this regard three varieties of cold baths,—baths with a temperature of 22° to 24° C., of 18° to 20° C., and of 14° to 15° C., and they regulate the temperature of the bath by the intensity of the fever and the resistance to refrigeration.

Before carrying the typhoid patient to the bath-tub, and in order to diminish the trying and painful sensation of cold, the abdomen is

* Brand, "De l'hydrothérapie dans le typhus," Stettin, 1861; "Bericht über die in Petersburg, Stettin und Luxemburg hydriatische behandelte Falle," Stettin, 1863; "Die heilung des Typhus," Berlin, 1868; *Wiener Medizin. Wochens.*, 1872, No. 6; "Salicyl oder Wasserbehandlung," *Deutsche Milit. Zeitsch.*, 1876; "Die Wasserbehandlung des Typhosen Fieber," Tübingen, 1877.

† Glénard, "On the Treatment of Typhoid Fever by Cold Baths" (*Lyon Médical*, 1873, 1874).

‡ Tripiér and Bouveret, "Typhoid Fever treated by Cold Baths." Paris, 1886.

rubbed with the water of the bath. Then the patient is placed in the bath, and all the time that he remains there the head is showered with ice-cold water. It is understood that the hair shall have previously been cut short in order to render these affusions more active. Brand recommends also to rub the belly and back of the patient during the time of the bath. The patient is kept in the bath about fifteen minutes; in certain cases the bath may be prolonged to twenty minutes. At the end of this time the patient is taken with shivering and chattering, and is then removed to his bed, and his lower limbs are covered with blankets. As for the rest of the body, in summer only a simple sheet is employed, and in winter a sheet covered by a woollen blanket.

At the end of twenty minutes the temperature is taken, and during the period of comfort which ensues, some nourishment is given. Every hour the temperature is taken anew, and when the mercury resumes its ascending march, and reaches 39° C. (102° to 103° F.), whether during the day or night, the patient is again plunged into the cold bath. Brand has fixed at about three hours the interval which should elapse between the baths, but this period may be made much shorter, and reduced to two hours, or one hour and a half if there be very high fever heat and great resistance to refrigeration. Brand insists also that in the interval of the baths the nurses should keep constantly applied over the abdomen of the patient compresses wet in cold water, and renewed as fast as they become warm.

The patient, when taking the bath and at all times, should be well supported with such nourishment as is suitable for his condition,—milk, wine, broths, peptonoids, etc. No other treatment is employed.

Such is Brand's method in all its rigorousness and exclusiveness. In order that it may give success, it must be applied from the very onset of the fever. In proportion to the tardiness and lateness of its inception, the chances of success are lessened. In reference to no mode of treatment has the appeal to statistics been more confidently made, and the advocates of refrigeration have endeavored to show that when Brand's system has been followed to the letter the mortality from typhoid fever is reduced to a very low figure.

I must here remind you that, according to Jaccoud, who has collected the statistics of eighty thousand one hundred and forty-nine cases of typhoid fever, the mortality averages 19.25 per cent., and we shall now see how far the cold-bath treatment has diminished this mean of nineteen per cent. In the exhaustive statistics which Brand has compiled from his own observations and those of other German physicians, and which pertain to eight thousand one hundred and forty-one cases treated by cold baths, the mortality is but 7.4 per cent. But the most interesting statistics certainly are those furnished by the Superior Council of the German armies. Here, in fact, rigorousness of discipline goes hand in hand with rigorousness of treatment, and has enabled the medical staff to reduce to a minimum the mortality from dothinenteritis. For instance, in the second corps of the Prussian army from 1867 to 1869 the mortality from typhoid fever was only 14.2 per cent., while from 1869 to 1874 it was but thirteen per cent. From 1874 to 1877 the army physicians commenced applying the method of Brand; the mortality then fell to 7.8 per cent. Finally, from 1878 to 1881, when the method was pursued with still greater rigor, the mortality was but 4.62 per cent.

I will spare you the further enumeration of statistics for or against Brand's method, for, as I have often insisted, both at the Academy of Medicine and in my lectures on Clinical Therapeutics—as a general rule, but little confidence can be placed in statistics as applied to therapeutic results. Do we not often see in our hospitals, under the same treatment, ordered by the same physicians, and carried out by the same set of nurses, the mortality from typhoid fever almost *nil* during certain seasons, then relatively considerable during the prevalence of an epidemic of unusual severity? But I must at the same time admit that the figures which have just been cited carry with them a certain conviction, and yet, despite these marvellous results,—since it is claimed that from nineteen per cent. the mortality is reduced to seven,—the method of Brand has made comparatively few proselytes. At the period of its greatest popularity it was limited, as Longuet shows, to Germany,* to a portion of Italy, and to the Lyons School of Medicine in France. But since the general adoption of the new antipyretic medicaments, the cold-bath treatment is becoming more and more abandoned, and it may be said that, as far as France is concerned, it is still in favor with only the Lyons school. Let us now inquire into the reasons for this neglect of a system concerning which such great expectations have been raised.

Four circumstances have been chiefly in-

* Longuet, "Où en est la methode de Brand" (*Lyon Médical*, 1882).

fluential in bringing about the abandonment of the refrigerant method in typhoid fever. These are, first, the difficulties of application; secondly, the dangers of the method; thirdly, the better knowledge which has been attained of the physiological and therapeutic action of this method of refrigeration; and, lastly, the discovery of the antithermic medicaments.

The difficulties of application are due chiefly to two causes,—the necessity, on the one hand, of applying the method from the very onset; and, on the other hand, the obstacles in the way of putting it into execution. It is always very difficult for us to make a positive diagnosis of typhoid fever before the end of the first week, and till the appearance of the lenticular rose-spots we can only make a presumptive diagnosis. I well know that Albert Robin has maintained that we have a positive criterion in the examination of the urine, but his conclusions have not as yet become generally accepted. In order, then, to carry out in all its rigor the method of Brand it is necessary to begin the cold-bath treatment from the very first day of the outbreak of the fever, and you have got to assume that you have before you a case of typhoid fever, and not one of simple ephemeral fever, or *embarras gastrique*, and this is in fact what does take place in Germany in the army corps where refrigeration by cold baths is carried out in all its severity. As soon as the patient has a fever heat mounting up to 39° C. (102° F.), he is plunged into a cold bath; then, if the sickness lasts but a week, the case is regarded as one of prolonged ephemera or gastro-intestinal irritation. If, on the other hand, it be of longer duration, it is called typhoid fever, and is treated as such.

But that which it is possible to do in the army, where, by reason of the discipline, one has the patients constantly under observation, becomes impracticable in the civil hospitals. Moreover, this necessity of applying from the very inception of the disease these so-called jugulating methods is insisted upon by all the advocates of this kind of treatment, and quite recently Pécholier, a well-known representative of refrigerant medication, has reaffirmed the principle that in order to obtain all the benefits expected from tepid baths and sulphate of quinine you must have recourse to them from the very first day of the disease; and he says with perfect good faith, that if you find yourself mistaken in your diagnosis, you have done no harm in administering a little quinine and a few tepid baths to a feverish person.

In order to obtain the desired advantages from Brand's method, it must, as I have said, be rigorously and methodically applied, and you have seen by the description which I have given of this method that it is necessary to plunge the patient into the cold bath every three hours, day and night, and even oftener. That, moreover, during all the time of the bath an attendant or nurse must be employed in rubbing or sponging the patient. In our hospitals, where we always have a limited number of nurses, it is well-nigh impossible to provide each typhoid patient with a nurse whose special duty is to attend to him. This is one difficulty which has led to the abandonment, in the hospitals of Paris at least, of the method of Brand.

Is this method free from danger? If we can trust the advocates of refrigeration, cold baths give rise to no complication, and in typhoid fevers of thoracic form, with intense bronchitis, and even with broncho-pneumonia, the bath is of just as much utility. Save in peritonitis and intestinal hemorrhage, there is no contraindication to the employment of cold baths. Quite recently, moreover, Dr. Vincent, of Lyons,* has vaunted the innocuousness and the efficacy of cold baths in the treatment of typhoid fever complicated with pregnancy.

At the same time, these same authorities recognize the fact that in typhoid fevers tardily treated the state of the myocardium may constitute a contraindication, and, when the pulse becomes filiform and irregular, it is necessary to discontinue the cold baths. The advocates of Brand's method add that if any one has noticed during the course of the treatment by cold baths, sudden deaths, pneumonias, intestinal hemorrhages, this results chiefly from the two following circumstances: first, that the medical attendant has not followed to the letter the directions laid down by the physician of Stettin, and, secondly, that the treatment was begun too late. However this may be, such accidents may take place, and we have seen them deter several physicians from the further employment of the refrigerant method during the trials which were made in the hospitals of Paris in 1882 and 1883.

We have just examined successively the difficulties of application and the dangers of the method of Brand; it now remains, from the physiological stand-point, to inquire into the therapeutic action of the refrigerant

* Vincent, *Lyon Médical*, August 28, 1887.

method. As I have many times told you, the danger ensuing from hyperthermia does not result from the hyperthermia in itself, but from the exaggeration of the organic combustions which go along with this elevation of the temperature, or from the accumulation in the economy, as Albert Robin thinks, of the products of disintegration, an accumulation which goes on the more actively the more intense the febrile process becomes. Well, then, as I told you a few minutes ago, the researches of Frédéricq, the more recent and more complete experiments of Quinquaud, show us that cold baths, instead of moderating these combustions and these organic disintegrations, really enhance them.

Hence it is that Brand and all the advocates of his method have counselled, in order to repair these incessant losses of the economy produced by the fever, and exaggerated by the cold baths, to give the patient the utmost possible nourishment. At the same time, the teachings of experimental physiology warrant us in regarding the method of cold baths, considered as antithermic and applied to the treatment of febrile phenomena, as an irrational practice. It abstracts heat from the patient, but it augments the organic disintegration.

How, then, are we to explain the good effects obtained by the method of Brand? We are to look for the explanation, gentlemen, not so much in the abstraction of heat as in the tonic effects of the cold water and in the sedation thereby effected in the nervous phenomena which the febrile process determines; and I shall endeavor to show you, as we go on, that from this special point of view there are other hydropathic means which have the same effect without the same disadvantages. But I must first say something about the fourth circumstance which has conduced to bring about the abandonment of the refrigerant method: I refer to the employment of antithermic medicaments in the treatment of typhoid fever.

You know that we have found in the aromatic series several substances which depress the temperature, and we have successively utilized for this end, phenic acid, salicylic acid, kairin, thallin, antipyrin, and antifebrin; and everything warrants the expectation that this list will be considerably augmented. I have already given consideration to these medicaments in my lectures on "New Medications,"* and shall not now take up your time with any remarks concerning them, only observing that of all these antithermics the least dangerous is assuredly antipyrin.

We are able by means of this new febrifuge to bring down almost at will the temperature of the patient, and keep him at a temperature not much, if at all, exceeding the normal. This kind of treatment has been brought into use in Lyons, and in particular by Clément,† who has given the results of his practice for the last two years. The mortality from typhoid fever, as treated by antipyrin, is stated to be 8.45 per cent., which is a little less than that of typhoid fever treated by cold baths, for we see that in the hospital of Croix-Rousse, where this latter method has been applied, the mortality has been quoted at 9.67 and 9.72 per cent. So, then, if we accept these statistics, we find that the antithermics give about the same results as cold baths.

As for myself, who have made much use of the antithermic medicines, and in particular of antipyrin, I recognize that this medicament reduces the temperature, but in nothing modifies the gravity of the disease, and does not mitigate the nervous phenomena, whose manifestations are, however, happily modified by the other hydrotherapic means of which it remains for me to speak, —namely, lotions, wet wrappings, and tepid baths.

I shall only speak from memory respecting the ingenious apparatus constructed by Galanti under the direction of Dumontpallier, and which enables us to maintain over the whole thorax a constant given temperature by means of a current of water passing through coils of rubber tubing, and, so to speak, completely enveloping the patient. This is a procedure which enables us to make more precise experimental researches, but which has never come into general practice, and I pass now to the consideration of lotions.

The cold lotion is an excellent hydrotherapic means, which you see me put in use in the treatment of the greater part of my cases of typhoid fever. We make these lotions by means of a large sponge dipped in cold water, to which we sometimes add an antiseptic such as phenol and thymol. The sponging is made with great rapidity; it should last from one to two minutes; and in order not to wet the patient's bed we have him lie on a rubber-cloth during the opera-

* THERAPEUTIC GAZETTE, 1885, p. 577.

† Clément, "On the Treatment of Typhoid Fever by Antipyrin" (*Lyon Médical*, December 4, 1887).

tion. After the sponging it is not necessary to wipe the patient thoroughly dry; you remove the rubber sheet, and you put on again the patient's underclothing and night-dress, and cover him with his blanket. The sponging is repeated three, four, and even five times a day.

These lotions bring down the temperature, less, it is true, than the cold baths, but quite perceptibly. They alleviate the uncomfortable sensation of dryness and heat which the patient experiences, and this is a real relief to him. They also have the advantage of stimulating the cutaneous functions, and of keeping the patient perfectly clean. Lastly, they prevent the development of the disagreeable odor which often emanates from typhoid patients when you uncover them.

This means ought always to be put in usage when the temperature tends to exceed 39° C. (102 F.), but it is powerless, I admit, to combat hyperpyrexia and the nervous disorders. You can, nevertheless, attain this result by two means, of which it remains for me now to speak,—wet wrappings and tepid baths.

In the grave forms of typhoid fever with profound adynamia, you can derive great benefit by wrapping the patient in a wet sheet. This packing should be of short duration,—not exceeding fifteen or twenty seconds. The wet sheet, wrung out of cold water, should completely envelop the patient, head and feet included. It is understood that this wet wrapping is made either in the bed of the patient or (better still) on a cot by the side of the bed.

These tepid baths constitute an excellent means of treatment of typhoid fever. In 1876, in a communication made to the Medical Society of the Hospitals,* I showed all the benefits that may be derived from these tepid baths, and my opinion has not changed since then. Taking up again the practice of Dance and Hervieux, I pointed out that the tepid bath not only lowers the temperature but also calms the nervous symptoms in the typhoid patient. I added also the advantage in the promotion of cleanliness. Laure, of Lyons,† also recommends this practice, and I notice with satisfaction that Bouchard has recently adopted the tepid-bath treatment as an antithermic measure in the typhoid wards of his hospital. Pécholier also makes of these baths, conjoined with the employment of sulphate of quinine, the essential basis of his abortive treatment of dothinenteritis.

These tepid baths are administered in the following way; You place the patient in a bath-tub sufficiently full of water to cover the shoulders. The temperature of the water may vary from 30° C. to 35° C., so that there shall be at least 6° or 7° of difference between the temperature of the bath and that of the patient. In fact, you should not forget that if a bath at 35° is a warm bath in its relation to a well person with a temperature of 37°, it becomes tepid to a fever patient with a temperature of 40°. The duration of the bath may vary from one-half to three-quarters of an hour. During its continuance you may feed and support the patient with broth, wine, or milk. On removing the patient from the bath you wipe him with a towel, wrap him up in a blanket, and replace him in his bed. Besides a slight antithermic action, these baths produce a great sedation of the nervous system, the delirium is calmed, and sleep supervenes. Certain physicians, and in particular Reiss, have proposed to employ permanent tepid baths, and we have seen Reiss and Afanassjew keep their typhoid patients almost continuously in a bath whose temperature varied between 30° and 32° C. Others, as Ziemssen, counsel tepid baths gradually cooled down, and this is the way they proceed: At the commencement the bath is 35°, then it is gradually cooled down by adding cold water till the temperature is lowered to 20° in the space of fifteen or twenty minutes. Neither the practice of Reiss nor that of Ziemssen have found imitators in France, and we still give the preference to tepid baths, which, I repeat, in cases of typhoid fever complicated with ataxo-adynamic phenomena, give excellent results.

Hydrotherapy has been much resorted to in two eruptive fevers,—smallpox and scarlet fever.

Recommended by Rhazes, cold-water applications were rarely put in practice during the last century in the treatment of smallpox; we read, however, that Canon Hancock and the capuchin monk Rovida employed them with success at the onset of the eruption; but, as ever, it is to Currie that we are indebted for any truly scientific impulse given to the cold-water treatment of these febrile affections.

Taking a hint from a work published by William Watson, who had observed that

* Dujardin-Beaumetz, "On the Employment of Tepid Baths as compared with Cold Baths in the Treatment of Typhoid Fever" (*Medical Soc. of Hospitals*, December 22, 1876).

† Laure, of Lyons, "On the Employment of Tepid instead of Cold Baths," etc. Lyons, 1874.

natives of Bengal, immediately after the inoculation for smallpox, bathe themselves twice a day in cold water, discontinuing these immersions at the moment of the outbreak of the fever, to resume them on the second day of the eruption, Currie applied the method of affusions to the treatment of smallpox.

During our time, it is chiefly in Germany that the method has been put in usage, and I must mention more particularly in this connection the works of Bohn, Hebra, and Curschmann.

Bohn pretends that cold baths modify the eruption and render it more discrete. Hebra* adopts the following practice: As soon as the diagnosis is certain, the patient is sponged from hour to hour with water at 12° C. (53° F.). When suppuration appears, tepid water is used for the lotions. Moreover, two or three times a day a warm bath at 35° C. (95° F.) is administered; duration, fifteen to twenty minutes. Curschmann only employs cold baths in the period of invasion and eruption.

In France, but few trials have been made of refrigeration in the treatment of smallpox. Trousseau did indeed recommend cold ablutions in cases where the smallpox was complicated with cerebral symptoms, but this practice found few followers. Desnos and Huchard, in the epidemic of 1870 and 1871, made trial of the refrigerant method in the treatment of variola, and their conclusions are little favorable to this mode of treatment. They have, in fact, shown that cold baths and affusions do not act in an antithermic manner, but bring about a sedation of the nervous system.

Clement, of Lyons, who has published in the *Lyon Médical* a paper on the treatment of smallpox by cold baths,† has much vaunted this mode of treatment, and his conclusions are altogether more favorable than those of Desnos and Huchard. According to him, in fact, cold baths notably depress the temperature, and the effect is much more durable than in typhoid fever. There is a very marked sedation of the nervous disturbances, the delirium ceases, the respirations become less frequent, lastly, the eruption is less likely to become confluent.

As you see, the opinions are far from being concordant as to the advantages which may be derived from cold baths in the period of invasion and during the first days of the eruption. Hence, in view of these contradictory experiences, I think you will do well to be wary of cold water in the treatment of smallpox, and to make these applications only in exceptional cases, and rather to combat the disorders of the nervous system than to depress the temperature.

But, on the other hand, there is entire unanimity in the use of warm baths during the period of suppuration. I know of no better means for combating the septicæmia and the putrid infectious odor which smallpox patients develop during the suppuration period, especially when the eruption is confluent, and for my part I always have recourse to these warm baths. Lastly, during the period of desiccation, tepid baths and warm baths become obligatory in the treatment of the disease.

The temperature of these baths may vary between 22° and 25° C. (70° and 77° F.). We may prolong their duration and keep the patient for three-quarters of an hour, an hour, and even longer, in these baths. You may also augment their antiseptic action by adding boric acid, salicylic acid, phenol, thymol, and even chloral. But do not forget that the skin deprived of its epidermis, as it is at this time, rapidly absorbs medicinal substances, and be chary in the use of phenol and thymol.

It is still to Currie that we owe the usage of affusions of cold water in the treatment of scarlatina. He even treated his two sons by this means, and this was his usual procedure: When the temperature of the patient exceeded 39° C. (102° F.), he was placed naked in a bath-tub; then four or five pailfuls of cold water were poured over his body, and the operation was repeated every hour.

In France, Trousseau has been the chief advocate of this method. He reserved it for grave cases of scarlet fever. In Germany this mode of treating scarlet fever has been much employed, and this is readily intelligible when you think of the intense fever heat which frequently characterizes this disease, and of the great account which our brothers beyond the Rhine make of the refrigerant method in hyperthermia.

Thus, for instance, Liebermeister, Cohn, Pilz, Mayer, etc., have employed cold lotions, and especially cold baths, in the treatment of scarlatina, while, at the same time, recognizing that the antithermic action of cold

* Hebra, "Treatise on Diseases of the Skin," vol. i. p. 267.

† Clement, "Traitement de la variole par les bains froids" (*Lyon Méd.*, February 4, 1877).

baths is less favorable in scarlatina than in the other diseases of infancy.

To-day there is less enthusiasm than ever for this mode of treatment, and there is general unanimity in but rarely making use of cold lotions in scarlatina. At the same time, when there is a high fever heat and ataxo-adynamic disturbances, I believe that tepid lotions may render you some service.

Trousseau was in the habit of employing lotions of water, or vinegar and water, at a temperature of from 20° to 25° C. (68° to 77° F.). With sponges dipped in these lotions, the patient was rapidly rubbed from head to foot.

John Taylor practised wet wrappings, but with warm instead of cold water. He made use of a night-shirt, open in front, which was wrung out of warm water and wrapped around the sick child; then the child was put to bed, and covered with two blankets and an eider-down coverlet.

To sum up, then, I think that in scarlet fever it is only exceptionally that you should have recourse to cold-water or even warm-water applications, and to combat the hyperthermia you should resort to antithermic medicaments.

Before passing to the treatment of other local inflammatory diseases by cold water, I must say a few words about miliary fever, which has also been combated by this means. Thus it is that in the epidemics of Picardy and Languedoc, much use was made of lotions of cold water. I do not know whether this remedial measure was adopted in the recent epidemic which visited certain of our departments in the centre of France.

The cold-bath treatment of local inflammatory diseases has had considerable vogue. I shall allude more particularly to rheumatism with hyperthermia and to pneumonia. There are certain forms of rheumatism, generally complicated with cerebral accidents, in which we see the temperature attain a very high figure,—41°, 42°, and even 44° C. To combat this hyperpyrexia, the heroic employment of cold water has been recommended. Already, in 1864, Stekler and Suret employed compresses wet with cold water and cold lotions in combating these hyperthermic forms. But it is in England that this method has had the greatest vogue, and we see Sidney Ringer in 1867, and Wilson Fox in 1871, using cold-water immersions in cerebral rheumatism; practices to which Maurice Raynaud, Féréol, Blachez, and Colrat, of Lyons, gave a new popularity by the cures which they attained in hyperpyrexial rheumatism by cold baths from 1874 to 1877.*

But to-day this method has gone almost completely out of use, owing to the fact that by reason of the salicylic acid treatment we have so far a mastery of acute rheumatism that we no longer observe these hyperthermic forms, and, if they should occur, I think that they may be more efficaciously combated with antipyrin than with the refrigerant methods by cold water.

Pneumonia, that type of acute febrile diseases, has not escaped the treatment by cold baths, and, if we may believe Loeber, of Breslau, this is the best mode of treatment of fibrinous pneumonia. Liebermeister has furnished in support of this method some very favorable statistics, showing that at the hospital of Basle, before the employment of cold baths, the mortality from pneumonia was twenty-three per cent.; it fell to 16.5 per cent. after the adoption of the refrigerant system. Jurgensen is just as enthusiastic in favor of this method, and did not hesitate to treat his own daughter, attacked with pneumonia, by cold baths.

Mayer, of Aix-la-Chapelle, has extended the employment of baths to the treatment of pneumonia in children, and we find among his observations the case of an infant of seventeen months, who, in the course of an attack of fibrinous pneumonia, took, during a space of eleven days, sixty baths at a temperature of 23° C. These baths are regarded as quite as applicable to catarrhal as to fibrinous pneumonia.

I believe that this is carrying this mode of treatment too far, and that much which has been stated in favor of it must be regarded as exaggeration. It is, in fact, by no means proved that cold baths are any more advantageous than any other mode of treating pneumonia, and as this method is not entirely without danger, it has not been put to use in our country, save exceptionally by the school of Lyons.

To-day, even in Germany, the treatment of pneumonia by cold baths seems to be abandoned, and when in the regular course of

* Maurice Raynaud, "Application of the Method of Cold Baths to the Treatment of Cerebral Rheumatism" (*Journal de Thérapeutique*, No. 22, 1876). Blachez, "Cerebral Rheumatism,—Treatment by Cold Baths" (*Gaz. Hebd. de Med. et de Chir.*, 1875, Nos. 7 and 8). Colrat, "Cerebral Rheumatism,—Treatment by Cold Baths, Recoveries" (*Lyon Médical*, 1875, No. 39). Féréol, "Efficacy of Cold Baths in Cerebral Rheumatism" (*Soc. des Hôpitaux*, June 8, 1877).

pneumonia there supervenes hyperthermia, we combat it as a part of the general treatment with our antithermic medicaments.

Such, gentlemen, are the considerations which I wished to present respecting hydrotherapy. In previous lectures I have shown the therapeutic advantages of exercise, of massage, and of cold water. It remains for me, before completing my subject, to set forth the benefits which the physician may derive from air and climate in the treatment of diseases. This is what I shall endeavor to do in my next and concluding lectures.

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*NOTES ON THE TREATMENT OF WHOOPING-COUGH WITH ANTIPYRIN.**

By J. P. Crozer Griffith, M.D.†

THAT whooping-cough is one of the opprobria of medicine scarcely needs to be remarked; and were this not admitted, the long list of therapeutic measures which have been employed in its treatment would prove that none of them have given satisfaction. Among the means of treatment which have been proposed and tried may be mentioned the use of belladonna, alum, quinine, opium, chloral, the bromides, cocaine, carbolic acid, cochineal, quebracho, gelsemium, salicylic acid, turpentine, resorcin, castanea, hydrocyanic acid, sulphur both internally and by fumigation, compressed air, asafœtida, peroxide of hydrogen, change of climate, cannabis Indica, inhalation of the vapors from the purifying chambers of the gas-works, boracic acid and other drugs by insufflation, pyridin, and amylene hydrate, which by no means closes the list. Even the laity have learned to know or to suspect how helpless the profession is in the treatment of many cases of the disease, and either let the malady run its course, or employ some of the patent medicines so widely advertised.

This helplessness is, indeed, acknowledged by many of the ablest writers on the subject. Wiederhofer states that nearly all the drugs in the Pharmacopœia have been used in the convulsive stage with little or no effect. He says further, that new specifics are proposed towards the end of nearly every epidemic, but at the beginning of the next outbreak they are no more heard of; this being due to the fact that the medicine was only useful in the third stage. He claims, too, that the disease is never cured by change of climate. Henoch says, "You will unfortunately gain no honor by your treatment." He deems the affection incurable, and thinks that there is no plan of treatment which will cut the paroxysmal stage short, while in the third stage almost any drug *seems* to do good.

It does not come within the province of these notes to inquire into the nature of the disease. Although most probably of a mycotic origin, the antiseptic plan of treatment, as such, does not seem to have much effect.

Whooping-cough is, I need not say, usually divided into three periods not very sharply separated from each other. The *first*, or *catarrhal*, stage lasts an uncertain time, but averages, according to Meigs and Pepper, two weeks. Squire says the duration is about one week, while Gerhardt gives it as varying from a few days to four or five weeks. The *second*, or *paroxysmal*, stage stretches over thirty to forty days or even a longer time, during which there is no amelioration to be observed. The *third* stage, or *stadium decrementi*, begins with the evidences of decline in the severity of the symptoms; the cough becoming less paroxysmal and more bronchial in character. The length of this period is very uncertain; continuing from ten to fifteen days to perhaps several months. The total duration of the disease Henoch puts at an average of eight to nine weeks.

The malady is certainly not one to be regarded with indifference or to be let alone. Biermer calculates that 7.6 per cent. of the cases die; though Löschner's estimate of one in twenty-seven or thirty is adopted by Gerhardt. In England and Wales, between the years 1858 and 1867, one hundred and twenty thousand persons died of the disease, and in Prussia, between 1875 and 1880, eighty-five thousand succumbed. Any means of treatment, therefore, affording a reasonable expectation of checking its course in severe cases cannot but be heartily welcomed by the profession; but in testing it, it is evidently of the highest importance that it be applied during the first or second stage. In this connection the article of Sonnenberger (*Deutsche Med. Wochenschr.*, 1887, 280), on the use of antipyrin in whooping-cough is of so great value and interest that a short account of his results may not be out of place here. This author had under observation since 1884 two large epidemics of the disease at Worms; and be-

* Read before the College of Physicians of Philadelphia, January 4, 1888.

† Assistant Physician to the Hospital of the University of Pennsylvania.

coming greatly dissatisfied with the usual methods of treatment, determined to experiment with antipyrin. As a check upon his results he treated some members of a family with this drug, and to others taken sick at the same time he gave quinine or chloral, or the bromides, or some other well-recognized plan of treatment. In other instances he administered antipyrin for a few days, then allowed an interval to pass in which no medicine was given, and finally returned to antipyrin. In a short time it became clear to him that this drug exceeded in value all others which he had yet employed for the malady in question; and he has continued to use it up to the present time,—a period of two and a half to three years. He treated about seventy cases of the disease with antipyrin alone; giving it in doses of ¼ grain in quite young children, up to 7 to 15 grains, for larger children or adults, three times a day; though he believes much larger amounts might be given.

A most important fact is that the best results were obtained when the course of treatment was commenced at the beginning of the disease. Under these circumstances the affection lasted in all but three to five weeks, and was of a mild character, with not more than six to seven slight paroxysms in the twenty-four hours. When it is remembered that an average case has, according to Eichhorst, twenty to thirty paroxysms in a day, while in a severe case the number may even reach one hundred, it will be recognized what an improvement this is. But even when the treatment was instituted at the acme, and with the most unfavorable hygienic surroundings, good results were obtained. The paroxysms often became less violent after the first dose, and after several days occurred less frequently. When the drug was stopped the symptoms grew worse, showing that the effect was actually due to its use. In only five cases did he observe complications, and there was no instance of antipyrin-collapse. It would seem, then, pure cavil to deny that in antipyrin we have a drug capable of influencing whooping-cough most powerfully, especially in the first and second stages, where other means so often fail.

Encouraged by Sonnenberger's success, I have administered antipyrin in several instances of whooping-cough, and with excellent results. The number of cases is not large enough to be of great value, except as confirming this author's statements; but it seemed to me better to report them now, rather than to wait with the object of adding to them. My experience agrees with that of Sonnenberger, that the drug is most efficient when given early in the disease. I make no claim, of course, that antipyrin is an absolute specific; indeed, the first of the cases briefly reported below is an instance, though the only one, of the total failure of the drug. Most of the cases show, I think, that it may prove of great value in this disease, though in some of them the treatment was begun too near the third stage to offer a decisive test.

CASE I.—*August* 5, 1887.—Thomas R., aged 4 years; has had a cough for three or four weeks, but has only whooped this week. Ordered 2 grains antipyrin t. d.

August 12.—Condition is much the same. Increased dose to 4 grains t. d.

August 18.—No marked change. Ordered 3 grains every three hours.

August 19.—No improvement. The child had paroxysms every one to one and a half hours last night. The chest is very full of mucous râles. Ordered 4 grains antipyrin every three hours, together with an expectorant mixture.

September 12.—The child has quite recovered.

NOTE.—Antipyrin proved absolutely useless in this instance.

CASE II.—*August* 5.—Nellie D., aged 4. Is said to have had a cough for five or six weeks, and has whooped for two weeks. Coughs up a little blood with mucus. A sedative expectorant mixture has had no effect; added to it to-day tr. belladonnæ, gtt. iv, t. d.

August 12.—Slight improvement only. Belladonna mixture stopped, and ordered antipyrin, gr. ii, t. d., and quinine, gr. ii, t. d.

August 18.—Certainly better, though she still whoops badly, and vomits after it. Gave antipyrin, gr. iii, every three hours.

August 19.—Decidedly improving; observations ceased at this date.

NOTE.—The improvement in this case, though not very marked, was fully equal to or greater than that following the use of belladonna.

CASE III.—*August* 5.—Carrie H., aged 5; has coughed for six or seven weeks, though the whoop was first heard about three weeks ago, and the paroxysms are now long, frequent, and followed by vomiting of mouthfuls of blood. Ordered antipyrin, gr. ii, t. d.

August 12.—Improvement began *at once*, and was marked. The paroxysms are less frequent and severe, and no more blood has been vomited.

August 18.—There are not more than four or five attacks a day. Increased dose to gr. ii every three hours.

August 22.—Does not cough at all at night, and only one or two times in the day.

NOTE.—Although well advanced in the second stage, the sudden and permanent improvement shows the good effect of the drug. Patient nearly well in two weeks.

CASE IV.—*August* 12.—Willie P., aged 4; has coughed for three or four weeks, and whooped for seven to ten days. The paroxysms are severe and frequent, and he vomits very often. A few râles may be heard in the chest. Ordered antipyrin, gr. iii, t. d.

August 18.—Both whooping and vomiting have entirely ceased. Increased dose to gr. iii every three hours.

August 22.—Still coughs occasionally, but does not whoop; vomits only rarely.

NOTE.—This case is a beautiful example of the effect of the drug at the beginning of the second stage, with virtually complete recovery in six days.

CASE V.—*August* 12.—Frank McG., aged 2 years; has coughed for some time, but has not whooped. Continued an expectorant mixture which he had been taking.

August 18.—The child commenced at about the time of my last visit to whoop three or four times a day, and his nurse has to go to him often at night on this account. Ordered antipyrin, gr. iss, every three hours.

August 22.—The paroxysms are decidedly lessened in number. For two nights he has needed no attention at all. Medicine continued.

NOTE.—A decided action on the part of the drug. The patient suffered later from a severe bronchitis, for which treatment was required; but the paroxysmal character did not return.

CASE VI.—*August* 5.—Mary B., aged 7 years; has coughed for two weeks, and the paroxysmal stage is just beginning, as she has whooped and vomited for a few days only. Ordered antipyrin, gr. iv, every three hours.

August 12.—Very greatly improved; coughs but seldom, and the "kinks" have nearly disappeared. Medicine continued.

August 18.—Does not cough at all. Medicine stopped.

NOTE.—A remarkable case, in which the disease appears to have been aborted in the second stage, lasting scarcely two weeks.

CASE VII.—*August* 15.—Edward S., aged 2 years and 10 months; has been whooping for a few days only, but severely, and vomits about four times in the day. The mother says she is up with him all night. Gave antipyrin, gr. ii, every three hours.

August 18.—The mother declares "the medicine worked like magic," and that the improvement has been the talk of all the neighborhood. The child has vomited only twice since the 15th, and does not whoop more than twice a day. The improvement began on the first night after treatment was commenced, and the mother did not need to be up either that night or any since. Medicine continued.

NOTE.—There can surely be no question that the very striking result experienced here, occurring as it did so early in the disease, was certainly due to the influence of the medicine.

CASE VIII.—*October* 19.—Annie M., aged 15 months. A not very intelligent mother states that six or seven weeks ago the child coughed and whooped, but did not vomit. She grew better, but later became worse again, and for three weeks has had paroxysms every hour, followed by vomiting. Sleep is poor. Ordered antipyrin, gr. i, every three hours.

October 21.—No vomiting since last seen, and has "slept elegant." The child whoops still, but not so often. Increased dose to gr. iss every three hours.

November 2.—Medicine was continued until 28th ult. Child been much better. Since that date no medicine given, but condition has remained improved.

November 25.—Cough had entirely disappeared, but a week ago the child became thickly covered with the eruption of varicella, and the paroxysms returned in full force, being very long and severe, though not very frequent, and not followed by vomiting. Ordered antipyrin, gr. iss, every three hours, which seemed to relieve them promptly.

NOTE.—The very sudden improvement when first administered indicated the power of the treatment, though the disease was probably too far advanced to offer a sufficiently severe test. The cessation of the paroxysms after November 25 would probably have followed the disappearance of the eruption in any case.

CASE IX.—*October* 28.—George B., aged 3 years; has coughed for two weeks, but has had no "kinks" until the last seven days, and is constantly growing worse. The paroxysms are not very frequent, but are sometimes very severe, and are often followed by vomiting. Ordered antipyrin, gr. iss, every three hours.

November 4.—The child coughs a great deal less, and has only vomited once during the night since he was last seen. Sleeps so much better that he does not need the powders at night. No medicine has been given to-day, and but two doses yesterday, and to-day the child has commenced to whoop and vomit more than usual. Medicine renewed.

November 14.—Improvement again followed the use of the powders, but none have been given since the 10th, and the patient is perhaps a little worse, though greatly better than at the beginning of the treatment.

NOTE.—We have here an instance of aggravation of the symptoms following an intermission in treatment, and of permanent benefit after its renewal.

Desiring to make as thorough a trial of the value of the drug as was possible, I requested several medical friends to administer it in such cases of whooping-cough under their care as they might think best. The remaining notes are the result of their very kind assent. The first three cases were under the care of Dr. Geo. E. Shoemaker, the next two under that of Dr. T. Hewson Bradford, and the last under that of Dr. Wm. C. Lott.

CASE X.—*August* 16.—Sophie M., aged 4 years; has been whooping for two or three weeks. Ordered potas. bromidi, gr. ii; ext. quebracho fld., ℥iv; tr. belladonnæ, gtt. ii, every three hours.

August 23.—No better. Medicine stopped, and ordered antipyrin, gr. ii, every three hours.

August 26.—Practically well. Improvement began at once, and has gone on steadily since the powders were first given. She has cough occasionally, and only at night, and the paroxysms are not violent.

NOTE.—Though, it is true, well on in the second stage, antipyrin was at once effectual where other remedies had failed.

CASE XI.—*August* 6.—Maggie S., aged 16 months; has had a severe cough for some time.

August 9.—Characteristic paroxysms began about this date. Given tr. belladonnæ, gtt. iii, every three hours.

August 11.—No improvement, and paroxysms are very severe and frequent. Ordered alumen., gr. iit. d.,

August 16.—Condition unchanged. Ordered tr. belladonnæ, gtt. ii; ext. quebracho fld., gtt. ii; potas. bromidi, gr. ii, every three hours.

August 23.—The patient is slightly better, the paroxysms being reduced to about one every half-hour. Substituted antipyrin, gr. iss, every two hours, for other treatment.

August 27.—The paroxysms are much less frequent both by night and by day, and the mother declares the child to be much better.

NOTE.—A case where several of the well-accepted remedies totally failed, and where antipyrin was a decided success, and at once.

CASE XII.—*October*, 1887.—A child of 5 years. Had been under unknown treatment for two weeks or more without benefit. Whooping-cough well developed, with frequent daily and nightly paroxysms preventing the proper amount of sleep. Gave antipyrin, gr. iss, every two hours, with immediate improvement as regards the severity and duration of the paroxysms, and with the entire abolition of the attacks at night. The subsequent course of the case is unknown, except that the father later expressed himself as highly delighted with the action of the medicine.

NOTE.—Another instance of sudden and great improvement at the acme of the disease.

CASE XIII.—*September* 24.—M. I., aged 2½ years. The disease had lasted through probably twenty-one days of the second stage. Ordered antipyrin, gr. ii, every three hours.

October 3.—The mother reports that the child was much relieved after the first dose, and the paroxysms have continued to be diminished in number and violence. Medicine continued.

October 14.—The improvement is still marked.

CASE XIV.—*October* 1.—J. H., aged 1 year; had been sick three weeks when first seen. Ordered antipyrin, gr. ii, every two hours.

October 3.—Mother reports marked improvement.

NOTE.—Both of these cases were perhaps too far advanced in the disease to constitute sufficiently severe tests; nevertheless, the first especially would seem to offer good evidence of the activity of antipyrin.

CASE XV.—*August*, 1887.—Robert H., aged 3 years. The disease had commenced six weeks before he was first seen by Dr. Lott. In the first week of observation the paroxysms were frequent and violent, and often followed by vomiting of food taken, and by severe epistaxis, so that the child soon became very weak from starvation and from loss of blood. The usual methods of treatment were employed for a week, but without the slightest relief. Antipyrin, gr. ii, every three hours, was then ordered, and other treatment stopped. After twelve hours amelioration began, and in two days the paroxysms

were reduced to six or eight in the twenty-four hours; epistaxis and vomiting ceased, and the appetite returned. At the end of one week's treatment with antipyrin the paroxysms were brought down to three or four in twenty-four hours, and attendance was discontinued.

NOTE.—Although perhaps somewhat advanced in the disease, yet this case is an excellent example of the superiority of antipyrin to other plans of treatment. Such rapid and complete improvement following the administration of the medicine in so severe a case could scarcely be a mere coincidence.

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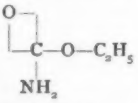
*CHLORAL AMMONIUM—TRICHLORAMIDO-ETHYLIC ALCOHOL.**

BY W. B. NESBITT, B.A., M.D., TORONTO, CANADA.

THE above compound is of interest to us, inasmuch as it promises to be an example of the modification of physiological action derived from a definite modification in chemical constitution. The discoveries of Crum-Brown, Fraser, and Schroff have shown that by modifying artificially the chemical constitution of a compound it is possible to definitely modify its physiological action.

Thus the introduction of the same radical—viz., methyl—into various compounds always gives rise to similar modifications in physiological action, as when they introduced methyl into strychnine, brucine, and thebaine, and formed methylstrychnine,[1] methylbrucine,[1] etc. Instead of the usual convulsive action on the cord of the unmodified substances, the methyl derivatives had a paralyzing effect on motor nerve terminations, and also other drugs which have no convulsive action, yet exert a paralyzing action on the introduction of the methyl radicle into their constitution. Here we have methylcodeine, methylmorphine, ditoluyldiethyl,[2] toluyldiethylamyl,[2] etc.

Still more recently Schmiedeberg has given us urethan[3] ethylcarbamate,



as he considered that from the chemical constitution there should be a combination of physiological actions, a sedative effect being exercised by the ethyl radicle C_2H_5 on the cerebrum, and a stimulating one on the medulla and cord by the amidogen NH_2. In this, therefore, there should be, as in chloral, a soporific action, without the concomitant danger of paralyzing the respiratory centre and heart.

It was on reading Schmiedeberg's work and the inferences drawn as to the superiority of urethan over chloral, and also, a consideration of the instances in which chloral would be superior to urethan, that it occurred to me that chloral might be so modified in chemical constitution as to obviate some of its dangers. The next point was to modify it, and at the same time affect as little as possible its normal action, knowing that ordinary aldehyde (ethaldehyde), combined with ammonia to form aldehyde ammonia, or, more correctly, from its reactions, *amidoethylic alcohol*, $CH_3.CH(NH_2)OH$, the inference was that trichlorethaldehyde, chloral, would act in the same way. On consulting the literature of the subject I found that the compound chloral ammonia, or, more correctly, *trichloramidoethylic alcohol*, $CCl_3.CH(NH_2)OH$., was a definite crystalline one, and had been made so long ago that the original worker's name was not mentioned, but what was of more practical importance to me was the description by Schiff[4] of the best method of preparing it. This consists in dissolving *dry* chloral, CCl_3CHO (not the hydrate), in one and a half times its bulk of *dry* chloroform, and passing cooled *dry* ammonia gas rapidly through the solution until the whole suddenly solidifies. The italics are mine, and the whole does not suddenly solidify. In preparing it place the solution in an ordinary *wide-mouthed* bottle, fitted with a cork and two bent tubes, one of which, the afferent, passes just below the liquid, at about the centre of the bottle, the other, the efferent, passing just through the cork. This bottle is then placed in a beaker of ice-water, and the cooled gas passed into it. It is necessary to keep the whole quite cool, otherwise the heat of reaction would decompose the compound. The ammonia is absorbed very rapidly. First that portion of the bottle above the surface of the contained liquid becomes filled with dense white fumes. These speedily disappear, leaving the upper portion quite clear, and the liquid becomes dull, owing to commencing crystallization. If the gas-supply is now properly regulated, the ammonia will be absorbed as fast as it passes in, and no odor of it can be detected at the efferent tube. The bottle now gradually be-

* Read before the Canadian Institute, February 4, 1888.

comes filled with white crystals, closely packed from the bottom up, and from the sides towards the centre, until only a small portion of the solution is left, and the ammonia may be perceived to be passing over without being absorbed. As soon as this occurs the reaction must be stopped. The superabundant chloroform is now poured off (and preserved for future use). The resulting mass, which consists of fine crystals, must be pressed in filter-paper and dried in vacuo. The odor of the compound is peculiar but not unpleasant. The taste, when a very small portion is taken, was compared by a friend to that of butternuts. However, when a dose is taken, it leaves a taste similar to that of chloral; but, unlike the latter, it immediately disappears upon taking a couple of mouthfuls of water. I have administered it in some forty different cases, and have not found any unpleasant effects to occur. The dose has been from 5 to 20 grains.

In all the instances, but three, mentioned above there was an increase in the number of respirations and in the pulse-rate, for as long as I observed them, usually from half an hour to an hour. In some cases (nine) the increase was slight. In three the respiration and pulse remained the same.

The symptoms manifested immediately on taking the drug were a feeling of fulness or tension in the head, particularly noticeable in the region of the nostrils, and a pleasant diffusible warmth radiating from the stomach over the abdomen. The tension disappeared in a few minutes. In five observations with doses of five grains made on myself, the above symptoms were fully manifested, the respirations increased at the regular rate of about two per ten minutes for half an hour, the pulse increasing about twelve beats for that time.

For these latter *auto-observations*, however, I do not ask much credence, because, well knowing the close relations existing between the cerebrum and other nerve-centres, it is impossible to say, in this instance, just how far the *wish*, for favorable results, was *father* to the observed physiological action.

That there is, however, an undoubted stimulating action I am convinced, and I think is easily accounted for if we consider the amount of amidogen present. According to the molecular weight of trichloramido-ethylic alcohol, 164.5 parts of it will contain 16 parts of amidogen, and 1 part will contain a little less than $\frac{1}{10}$, or 1 gramme (15½ grains) will contain 1 centigramme, or 1½ grains, of amidogen, so that we have in a dose of 15 grains of chloral ammonia 1½ grains of amidogen, which would undoubtedly produce considerable stimulation. In comparison with urethan, it may be administered in any desired dose at once without disturbing the stomach. Indeed, it has a pleasant rather than an unpleasant influence on that organ, whereas urethan has to be administered in small doses that it may not cause vomiting. As to whether the chloral ammonium lessens the blood-tension, like chloral, especially in the kidneys, in the diseases of which the latter is of such value, I did not have the apparatus to determine, but from the close similarity in chemical constitution I should think it would, especially as the stimulant effects were much more noticeable on the respiration than on the pulse.

DIGITALIS AND ITS CUMULATIVE ACTION.

By Robert T. Edes, M.D., Washington, D. C.

In a recent unsigned article in the December number of the Gazette some points are raised in regard to the action of digitalis upon which I should like to comment.

Although there are few subjects in therapeutics in which a more satisfactory harmony exists between experiment on animals and clinical observation, yet the theory of this action is not in all points complete. The chemistry of digitalis is difficult and complicated, and the active principles of the drug, though isolated outside of the body, have never been traced through the circulation, except by their effects, and the statements as to their difficult solubility refer to their behavior when isolated in the test-tube; while it is not certain that in their natural combination in the plant they are so altogether refractory.

Our positive knowledge of their elimination is *nil*. Gubler, who suspects that digitalis is eliminated by the biliary secretion, states it as well ascertained that it does not pass into the urine, a fact (if it be one) that decidedly impairs the value of some theorizing as to the connection between cumulative action and defective diuresis. About the early action of digitalis, the only action, it seems to me, whatever be the dose required to produce it, that is desirable for therapeutic purposes, there is a gratifying unanimity of opinion among modern teachers both as to facts and theories.

"Digitalis in moderate doses stimulates the musculo-motor portion of the heart (probably

its contained ganglia), increases the activity of the inhibitory apparatus, and probably causes contraction of the arterioles by an action on the vaso-motor centres in the cord" (H. C. Wood's "Therapeutics").

If the action goes too far, this favorable condition is changed, gastric and nervous symptoms supervene, and soon the circulation, which has previously been sustained by the general stimulation, fails. The order of the phenomena is not always exactly the same, so the vomiting and vertigo may coexist with either a slow or a feeble and rapid or irregular pulse.

The final result is described by Wood as follows: "Poisonous doses induce, after a time, increase of the pulse-rate, with smallness and weakness of the wave and lowered arterial pressure."

And with this statement most authors agree.

It seems to me no forced interpretation which ascribes this condition to a paralysis or exhaustion of the heart and of the vaso-motor system. This is the view of Traube, based on experiments where the pulse, after large doses of digitalis, became very rapid and finally ceased in death (*Gesammelte Abhandlungen*, Band i. pp. 194 to 234).

It is true that the increased stimulation of the musculo-motor system at first, and its subsequent exhaustion, cannot be made quite so evident as the corresponding stages of the inhibitory action of the vagus, but the fact that after the administration of atropine, which paralyzes the inhibitory system throughout, the administration of digitalis quickens instead of slowing the heart, certainly points to a stimulating effect upon the direct motor system as well as upon the inhibitory; while if this increased activity carried too far does not run on into exhaustion, digitalis differs from every other known poison which acts through the nervous system.

The condition of the vaso-motor system does not affect the result greatly, as the calibre of the vessels is of very little consequence, after the heart has become too weak to force the blood into them.

This description applies to the continued administration to mammals of doses large enough to be finally poisonous. Extremely large ones may cause death, with a *slow* pulse, as in one of Traube's experiments.

When we consider, on the one hand, that the action of the heart depends upon the balance existing between at least three different forces, that these forces probably vary in different individuals, and certainly are greatly influenced by the general nutrition and temporary conditions of fatigue or excitement, and, on the other, that the drug we give to modify its action is really a mixture of several active principles not alike in action, it is certainly not strange that it does not act in every case in exactly the same way, and that, while the general result is nearly the same, sometimes one nerve and sometimes another should give out first.

The subject of the "cumulative" action of digitalis is one alluded to by all writers on therapeutics, and some on the practice of medicine, but carefully discussed by very few.

This name describes the fact that the action of a drug, and especially digitalis, may go on increasing, while the doses are either the same or diminished or suspended, or that its full action may be suddenly and intensely developed. As regards digitalis, this may sometimes apply to its therapeutic effect,—that is, to the extreme development of the first stage, as in the first case described in the article before referred to; but as the toxic effect is that which, when appearing unexpectedly, is especially to be dreaded, this is generally intended by most writers.

Thus Brunton: "Sometimes the symptoms of the physiological action of a drug, instead of increasing gradually, may do so suddenly, and it is to this kind of action that the term cumulative action is most usually applied. . . . After moderate doses of these drugs (digitalin and strychnine) have been taken for some time, it is found that, instead of the effects they produce appearing gradually, as we should expect from a gradual accumulation in the blood, the symptoms of poisoning become suddenly developed in somewhat the same way as if the dose had been suddenly increased."

Flint says, "There is little ground for the traditional notion that digitalis is peculiarly a cumulative remedy, the patient being liable to a sudden manifestation of its toxic effects."

Strümpell, "Since digitalis is one of the remedies which have a so-called cumulative action, the occurrence of symptoms of poisoning may be quite rapid and unexpected."

Husemann speaks of poisoning by the cumulative action, and especially of the nervous and gastric symptoms, and the *slow*, small, and intermitting pulse.

"Most authors of earlier and later times agree with Withering. From their communications it appears that by the so-called cumulative action of digitalis two series of phenom-

ena are understood. The first refer to the pulse, which, after repeated small doses, shows suddenly (*auf einmal*) a much greater slowing than would be expected from the dose given, or an irregularity, smallness, and rapidity which is usually only seen after very large doses (so-called third stage of Traube). The second consists in symptoms which point to a profound affection of the nervous system, and sometimes seem to have caused death, vertigo, nausea, vomiting, cramps, sleeplessness" (Van der Heide).

Several other authors mention the subject, but without defining their meaning with sufficient minuteness to make them worth quoting.

It is certainly fair to say that most authors intend by the use of the phrase "cumulative action" to denote the sudden supervention of toxic symptoms, and, in most cases, a rapid, or, at any rate, a feeble and irregular pulse.

It is also to be remembered that the increase of rapidity begins by the interpolation of feeble beats between the strong and slow ones, so that a slow radial pulse may coincide with a rapid and irregular beat of the heart.

I am willing to admit that the explanation of this phenomenon usually given by writers on therapeutics is that put forth by the author of the article referred to, and it is a very reasonable hypothesis; but it is not the only reasonable one, nor the only one held by those who have given special attention to the subject, and it must be remembered that there is not any *chemical* evidence of the retention of digitalis in the body for an unusually long time.

Gubler, who holds what we may for brevity call the storage theory, says that pills of digitalis, if so made as to be relatively insoluble, remain undissolved in the intestinal canal for some time, and then develop their effect all at once. This he calls accumulation of dose, which may obviously take place just as easily with any other drug that is given in the same way. It is to be distinguished from accumulation of effect, which is, in his view, the storage (*emmagazinement*) in the organ where the activity of the therapeutic substance is exerted. This may be the explanation of the cases where the effect of digitalis in slowing the pulse lasts for many days after the cessation of the administration, but it is not easy to understand how the quantity stored up should be dissolved in just sufficient amount each day to produce just the necessary effect, when it is so liable in another case to be precipitated all at once upon the heart.

Such a precipitation may very well take place in the class of cases (tapping) described in the article in the THERAPEUTIC GAZETTE, and undoubtedly furnishes a very plausible explanation of the phenomenon, like the uræmic poisoning supposed to develop rapidly on the disappearance of dropsical effusions; but such cases do not cover the whole ground. And even with these it may be noted that a feeble action of the heart, causing syncope, may follow the removal of a large amount of ascitic fluid, even when the patient is not under the effect of digitalis. The experiment of Goltz also bears on this point, where rapping of the surface of a frog's abdomen causes cessation of the heart's action from the accumulation of blood in the abdominal veins.

Gubler suggests another view, which, however, he does not adopt, and this is the one I have to advocate,—that it is the effect and not the substance of the dose which is left over to reinforce the action of subsequent doses.

If this seems too transcendental, I may suggest the parallel instance of delirium tremens, which develops rapidly in consequence of successive and excessive doses of alcohol, but which is very likely to begin after the patient has stopped drinking, and continues long after the alcohol has been partly eliminated and partly burnt up, which is positively known to take place within a few hours.

We know that certain lesions and degenerations remain after the drug that caused them has disappeared from the body, and there is no reason why the subtler molecular changes which undoubtedly accompany the action of drugs may not be, if not permanent, at least slow in disappearing. This view is clearly set forth by Traube (*Gesammelte Abhandlungen*, Band iii.):

"Wherein consists the cumulative action of digitalis? Evidently in that the action of the single dose lasts longer than is the case with other narcotics, with which, on the contrary, it can be observed that the effect of each dose diminishes that of the following one, or, rather, in that the action of digitalis possesses a second latent stage, which is wanting in the others.

"Let us imagine that digitalis acts by separating the molecules of the nervous substance from each other, and that its influence on the temperature and pulse first becomes manifest after the separation of the molecules has reached a certain distance, then the latent stage of the action of the drug would consist in the separated molecules coming *slowly* back

to a condition of equilibrium. If the drug is given again at this stage it will need, as will easily be understood, a smaller dose to produce again that degree of separation of the molecules with which the influence on temperature and pulse again appears.

"With other narcotics the latent stage is wanting, and therefore a cumulative action can only be observed with them under the condition that the following dose is given before the visible effect of the previous one has passed off.

"Every agent which is able to excite any portion of the nervous system to unusual activity loses a part of its power when it is again applied after the cessation of its action. This loss increases with the number of its applications if the dose remains unchanged.

"Is it possible that, among the heart-poisons, all of them possess this peculiarity, with the exception of those which act not only on the cardiac nervous system but on the heart-muscle?

"The action of digitalis on the regulatory system constantly becoming stronger under the use of smaller doses, may be explained on the basis of these views, like that experiment in which, after cutting the pneumogastrics, the electrical irritation of the peripheral segment constantly produces a more marked diminution of the pulse the more frequently it is repeated; provided that, in the mean time, the heart-muscle has been constantly losing in energy by the deficient supply of oxygen."

A very careful experimental investigation of this point has been made by Van der Heide (*Arch. für Exp. Path. und Therapie*, 1885, p. 127), who concludes that the cumulative action of digitalin is not due to its insolubility and consequent slowness of absorption, because it is just the same even when injected subcutaneously or into the blood, and because helleboreine, which is very soluble in water, has the same action. Neither is it attributable to a special delay in elimination, since there is no reason to suppose that digitalis or helleboreine are ever eliminated in quantity by the kidneys.

There is also direct evidence against any storage in the blood or tissues, since he was unable by the use of extracts prepared by Dragendorff's method from the organs of animals who had taken helleboreine for a long time to produce any characteristic effect upon the heart of a frog, and the injection of the blood of such animals into the blood of healthy animals was followed by completely negative results. The organs of animals which had died from helleboreine were fed to dogs, one of which that had eaten a large quantity had a temporary but decided reduction of pulse.

"We believe that the cumulative action of digitalin and helleboreine certainly cannot be made dependent on the simple physical or diffusion peculiarities of these substances, but more on the peculiarities of the chemical processes which go on in the organs which show the cumulative action, in that they are very slowly formed and destroyed. . . . This peculiarity depends more on the organs themselves than on the medicines employed."

The magnitude of the danger I have not spoken of. Flint, whom I have quoted in order to show the meaning he attached to the phrase "cumulative action," evidently does not consider it imminent.

Van der Heide says that even when cumulative action occurs we need not fear lethal or dangerous poisoning, and that in all his experiments the dangerous appearances vanished even when the dose was continued. He considers it better, however, to give it at long intervals and small doses, and to be especially careful if there is no action in the first few days. These remarks are, of course, based on experiments on animals, and might not be applicable without modification to all cases in the diseased human subject.

Other writers speak of it as a bugbear, or do not allude to the subject. I think the reason for this change of opinion or disregard of tradition is not far to seek, and depends upon the better understanding of the objects to be attained by the administration of digitalis. Instead of desiring chiefly a considerable reduction of the frequency of the pulse, to be brought about by large and perhaps increasing doses, the physician at present rather seeks regulation of rhythm and increased force and tension, which are accompanied by a moderate reduction in frequency, and he therefore gives the small doses. Hence he does not carry the heart so nearly to the point at which the therapeutic is liable to pass into the toxic stage, and at which a little additional call upon its activity, either by muscular exertion or by one or two doses too many, makes it cross the line of danger.

He drives with a tight rein, but with less application of the whip, so that his horse may not make so long strides, but is less likely to trip or to "break;" and if he is a little longer getting there, runs less risk of not getting there at all.

ON THE ABSORPTION OF LEAD CHROMATE.

By John Marshall, M.D.*

NUMEROUS cases of lead-poisoning have been attributed to lead chromate, yet, curiously enough, experimental proof of its absorption into the circulatory system, based upon the administration of the chemically pure salt, does not exist. The experiments detailed in this paper were made with the purpose of determining the matter of absorption.

Chemically pure lead chromate was prepared by adding neutral potassium chromate to a solution of lead acetate until the formation of a precipitate could no longer be observed. The precipitated lead chromate was placed in a large Erlenmeyer's precipitating jar, and repeatedly washed, by decantation, with distilled water until all traces of soluble lead salts and potassium chromate had been removed. This was determined by acidulating a portion of the clear, filtered wash-water with acetic acid and evaporating to a small volume, and testing a portion of the concentrated liquid with ammonium sulphide for lead. Another portion failed to show the presence of a soluble chromate on adding a solution of lead acetate. The precipitate was now collected on a Swedish filter-paper, and allowed to dry at ordinary temperature in a place away from direct sunlight and where the atmosphere was free from acid fumes. When the chromate was perfectly dry it was detached from the filter-paper and placed in a glass-stoppered bottle, from which portions were taken as occasion required.

The experiments were performed with dogs. Weighed portions of the chromate were mixed with water, so as to form a thick paste, and then placed in cavities in pieces of meat, and thus administered to the dogs. Several days before giving the chromate to the dogs rather large doses of potassium iodide were given them and the urine examined for lead. In no case was lead found after this preliminary treatment. Sufficient time was allowed for the complete elimination of the potassium iodide, determined by testing the urine for the iodide before beginning the administration of the lead chromate.

The iodide having disappeared from the urine, the administration of the lead chromate was begun and the urine collected by catheterization. However, the use of the catheter was very often unnecessary, because of the voiding of the urine during the preliminary struggles of the animal after giving ether. The urine was collected every day, but, because of the limited elimination of lead by the kidneys, the urine obtained in two days was mixed before examination, so that on account of the larger volume of liquid operated upon the possibility of finding lead, if present, would be greater.

In concluding the experiments the dogs were killed by giving chloroform, and autopsies were immediately made.

To determine the presence of lead in the urine, the method of decomposing the organic matter in the urine by means of hydrochloric acid and potassium chlorate, and separating the lead by electrolysis, as described by Lehman,† was employed,—namely, concentrated hydrochloric acid was added to the urine in the proportion of about 10 c.c. acid to 100 c.c. urine. The mixture was heated, and kept at the point of gentle ebullition, and from time to time small portions (about 0.2 gramme) of potassium chlorate were added, until the liquid possessed a pale straw color and the odor of free chlorine was strongly perceptible. The heating was continued, without further addition of potassium chlorate, until the odor of free chlorine had disappeared. On cooling, a partly flocculent material separated, and was filtered off, and the filtrate diluted with water to a volume equal to the original volume of the urine employed. This filtrate was placed in a glass tube of about 3.5 centimetres diameter and twenty centimetres length, the end of the tube being covered with parchment-paper, which was tightly bound by twine to the tube. A new piece of parchment-paper was used in every experiment. Both the twine and parchment-paper were free from lead, and it may be well to state here that all the reagents and filter-paper used in the work were proved beforehand to be free from lead and chromium. A glass tripod, on which lay a piece of platinum foil about 2.5 centimetres square, serving as a positive pole, attached to a platinum wire, was placed in a glass vessel containing distilled water very slightly acidulated with chemically pure sulphuric acid, the liquid covering the platinum foil. The parchment-covered tube containing the urine to be examined was set on the platinum foil, on the tripod, the

* Demonstrator of Chemistry in the Medical Department, University of Pennsylvania.

† *Zeit. f. Physiolog. Chem.*, Bd. vi. p. 7.

parchment-covered end being placed directly over the foil. Another piece of platinum foil, purposely cut round so as to nearly equal the calibre of the parchment-covered tube, attached at the centre to a wire (which wire, for the purpose of insulation, passed through a glass tube about twenty-five centimetres in length, and sealed at both ends), was put into the urine, so that the platinum foil in the tube, serving as a negative pole, should lie on the parchment-paper, as nearly as possible over the positive platinum pole, which lay under the parchment-paper on the glass tripod. The wires were connected with a battery consisting of three Grove cells. The current was kept up from two to six hours, dependent upon the quantity of lead in the solution. Sometimes, because of the considerable amount of lead in the solution, it was necessary to run the current only one hour. A dark gray or black deposit on the electrode in the urine would indicate the probable presence of lead. The electrode upon which the deposition occurred was taken out of the urine without interrupting the electrical current, and washed by gently dipping it several times in distilled water. The foil was then placed in a small beaker, covered with nitric acid, and, after warming five or ten minutes on a water-bath, it was taken out, washed with distilled water, and the wash-water collected in the beaker containing the nitric acid. The nitric acid solution was evaporated to dryness, the residue dissolved with a few drops of dilute potassium hydrate solution,* and then slightly acidulated with acetic acid. The solution thus prepared was tested by special tests for lead.

The following special tests for lead were made with portions of each final solution. In the subsequent work, when it is stated that lead was found, it is understood that the solution responded to all the special tests here described, with the exception, in some cases, of the potassium iodide test.

1. Water containing hydrogen sulphide, added to the warm solution, produced a brownish-black precipitate.

2. A portion of the solution, in a small test-tube, acidulated with acetic acid, and a few drops of sodium acetate solution added, gave, on dropping a minute crystal of neutral potassium chromate into the solution, a yellow precipitate of lead chromate.

3. A drop of dilute sulphuric acid added to the solution, in conjunction with alcohol, produced a white cloud of lead sulphate. On allowing this precipitate to settle, decanting the supernatant liquid, and washing the precipitate several times by decantation with water, and then treating it with ammonium sulphide, a black precipitate of lead sulphide was formed.

4. A very small crystal of potassium iodide added to the solution produced a yellowish precipitate of lead iodide. Under the microscope, the precipitate appeared to be a mass of crystals attached to each other, but whether they were in the form of six-sided plates could not be determined. On account of the limited delicacy of this test, it failed to respond in a few cases. Possibly in these special cases the failure might be attributed to the potassium acetate present in the final solution. Lead is not perfectly precipitated by a soluble iodide from a solution containing an acetate of an alkali.

In examining the liver, kidneys, and heart for lead, they were cut in small pieces, placed in a porcelain dish, covered with water, hydrochloric acid added in somewhat larger proportion than in the case of the urine, heated to and kept at the simmering-point, and potassium chlorate added in small portions at a time until the tissues were completely disintegrated. Heating was continued, at the same time keeping up the volume of the liquid by the addition of water, until all free chlorine was driven off. The liquid was filtered, and the filtrate divided in two portions. One portion was employed for the electrolytic separation of the lead, in the same manner as described in examining the urine for that metal; the other portion was examined for chromium by precipitating the lead with hydrogen sulphide, filtering, boiling the filtrate to expel hydrogen sulphide, and to concentrate the volume of liquid, and precipitating the chromium by ammonium hydrate. The precipitate was collected on a filter, washed, dried, and tested with a borax bead. The obtaining of a green-colored bead, the color of which was intensified by fusing a small piece of tin foil with it, was considered indicative of the presence of chromium.

The urine, after breaking up the organic matter with hydrochloric acid and potassium chlorate, was tested for chromium in the manner described in the examination of the liver and other solid organs for the same metal. The gall was treated in like manner, both in the examination for lead and for

* The potassium hydrate employed was free from lead and iron.

chromium. On account of the consistency of the gall, it was diluted with water before decomposing with hydrochloric acid and potassium chlorate.

Experiment 1.—Dog; weight, 17 kilos.

Date.	Quantity of $PbCrO_4$ given. Grms.	Two days' urine. C.c.	Lead.	Chromium.	Remarks.
Nov. 20...	0.02	.....	.....	.....	
" 22...	0.1	142	Nothing.	Nothing.	
" 23...	0.1	.....	.....	.....	
" 24...	0.2	125	Nothing.	Nothing.	Fæces colored black, and continued of that color to the end of the experiment.
" 25...	0.1	.....	.....	.....	
" 26...	0.5	137	Nothing.	Nothing.	
" 28...	0.5	.....	.....	.....	
" 29...	0.5	119	Found.	Nothing.	
" 30...	0.5	.....	.....	.....	Very slight paralysis of posterior extremities noticed.
Dec. 1.....	0.5	113	Found.	Found.	" "
" 2.....	1.0	.....	.....	.....	" "
" 3.....	1.0	110	.....	.....	" "
" 4.....	1.0	.....	.....	.....	" "
" 5.....	1.0	121	Found.	Found.	" "
Total.....	7.02 grms.				

The dog was killed December 12.

Autopsy.—The liver, kidneys, and heart appeared normal. The stomach showed no evidence of corrosion. No evidence of the action of a corrosive substance could be observed in the small or large intestines. The stomach and intestines appeared anæmic, otherwise perfectly normal. The large intestine contained fæces colored intensely black by lead sulphide.

The liver, kidneys, heart, and gall were taken for microscopical and chemical examinations. Under the microscope the liver, kidneys, and heart appeared perfectly normal. Lead was found in the liver, kidneys, and heart; not found in the gall. Chromium was found in the liver and kidneys; not found in the heart and gall.

Experiment 2.—Dog; weight, 15 kilos.

Date.	Quantity of $PbCrO_4$ given. Grms.	Two days' urine. C.c.	Lead.	Chromium.	Remarks.
Nov. 19...	0.02	.....	.....	.....	
" 20...	0.02	151	Nothing.	Nothing.	
" 22...	0.1	.....	.....	.....	
" 23...	0.1	134	Nothing.	Nothing.	
" 24...	0.2	.....	.....	.....	Fæces colored black.
" 25...	0.2	130	Nothing.	Nothing.	
" 28...	0.5	.....	.....	.....	
" 29...	0.5	131	Nothing.	Nothing.	
Dec. 1...	0.5	.....	.....	.....	
" 2...	1.0	109	Nothing.	Nothing.	
" 3...	1.0	.....	.....	.....	
" 4...	1.0	114	.....	.....	
" 5...	1.0	.....	.....	.....	
" 6...	1.0	120	.....	.....	
" 7...	1.0	.....	.....	.....	
Dec. 8...	1.0	117	.....	.....	
" 9...	1.0	.....	.....	.....	
" 10...	1.0	111	.....	.....	
" 11...	1.0	.....	.....	.....	A slight paralysis of posterior extremities noticed.
" 12...	1.0	123	.....	.....	
" 16...	2.0	130	Found.	.....	
" 17...	2.0	.....	.....	.....	
" 18...	2.0	119	Found.	.....	
" 19...	2.0	.....	.....	.....	
" 20...	4.0	124	Found.	Found.	
" 21...	4.0	.....	.....	.....	
" 22...	4.0	91	.....	.....	
" 23...	4.0	.....	.....	.....	
" 24...	4.0	105	Found.	Found.	
" 25...	4.0	.....	.....	.....	
" 26...	4.0	100	.....	.....	
" 27...	4.0	.....	.....	.....	
" 28...	4.0	103	Found.	Found.	Paralysis of posterior extremities very decided.
" 29...	4.0	.....	.....	.....	" "
" 30...	4.0	94	Found.	Found.	" "
" 31...	4.0	.....	.....	.....	" "
Jan. 1...	4.0	.....	.....	.....	" "
" 2...	4.0	.....	.....	.....	" "
Total.....	77.14 grms.				

The dog was killed January 4. The autopsy revealed the same conditions, macroscopically and microscopically, as in Experiment 1, except that under the microscope the liver appeared to be infiltrated with fat.

Lead and chromium were found in the liver, kidneys, and heart; not found in the gall.

Experiment 3.—Dog; weight, 11.5 kilos.

Date.	Quantity. of $PbCrO_4$ given. Grms.	Two days' urine. C.c.	Lead.	Chromium.	Remarks.
Dec. 12...	2.0	.....	.....	.....	
" 13...	2.0	112	Nothing.	Nothing.	
" 14...	4.0	.....	.....	.....	
" 15...	4.0	115	Nothing.	Nothing.	
" 16...	4.0	.....	.....	.....	
" 17...	4.0	105	Nothing.	Nothing.	
" 18...	4.0	.....	.....	.....	
" 19...	4.0	93	Nothing.	Nothing.	
" 20...	4.0	.....	.....	.....	
" 21...	4.0	97	Found.	Nothing.	
" 22...	4.0	.....	.....	.....	
" 23...	4.0	91	Found.	Nothing.	Partial paralysis of posterior extremities noticed.
" 24...	4.0	.....	.....	.....	
" 25...	4.0	94	Found.	Found.	
" 26...	4.0	.....	.....	.....	
" 27...	4.0	90	.....	.....	
" 28...	4.0	.....	.....	.....	
" 29...	4.0	.....	.....	.....	Marked paralysis of posterior extremities.
" 30...	4.0	.....	.....	.....	" "
" 31...	4.0	91	Found.	Found.	" "
Jan. 1...	4.0	.....	.....	.....	" "
" 2...	4.0	.....	.....	.....	" "
Total.....	84.0 grms.				

The dog was killed January 4. The autopsy revealed the same conditions, macro-

scopically and microscopically, as observed in Experiment 1.

Lead and chromium were found in the liver and kidneys; not found in the heart and gall.

All of the dogs became much subdued in spirit towards the close of the experiments. At no time did they show evidence of colicky pains, neither was a blue line observed in the gums. The blue line in the gums, usually found in cases of lead-poisoning, is undoubtedly due to lead sulphide, and is produced by the action of hydrogen sulphide, resulting from the decomposition of food remaining between the teeth upon the lead compound in the tissues. In many cases of lead poisoning the blue line may be entirely wanting, though the other symptoms of lead-poisoning may exist. The absence of the blue line in such cases may be attributed to the cleanly habits of the individual,—namely, in thoroughly removing depositions of food from between the teeth by means of a tooth-brush or tooth-pick. The three dogs used in the experiments were young, and, as their teeth were clean at the beginning of the investigations, and the food given them was meat cut in small pieces, which they swallowed without chewing, there was no opportunity for food to collect between the teeth.

The dogs lost considerably in weight. Partial paralysis of the posterior extremities was noticed in each of the three dogs. Emesis did not occur at any time. The fæces were always soft, and were black in color.

Owing to the insolubility of lead chromate the question arises, How is this material taken into the circulation? Is it absorbed in the stomach or in the intestinal tract? Is it absorbed as lead chromate, or is it broken up into soluble compounds, and absorbed as such? In the experiments described in this paper lead and chromium were found in the solid tissues, and also in the urine, thus proving the absorption of both metals; but concerning the manner of absorption and the nature of the compounds of these metals as they exist in the tissues we are still in the dark.

To endeavor to determine the manner of absorption of lead chromate, the following experiments with the salt were conducted outside the animal body under some conditions which exist in the body.

A 0.2 per cent. solution of hydrochloric acid, approximately representing the quantity of free hydrochloric acid present in the gastric juice, was prepared. About 0.3 gramme lead chromate was added to a trifle over fifty cubic centimetres of the 0.2 per cent. acid solution, and the mixture, which was frequently shaken, was kept at the body temperature about twenty minutes, then filtered through an extra thick Munktell's Swedish filter-paper. On warming the clear filtrate and adding hydrogen sulphide to it, a copious precipitation of black lead sulphide occurred. Potassium chromate added to another portion of the filtrate gave a heavy yellow precipitate of lead chromate. Thus it is shown that water containing about the same percentage of hydrochloric acid as is found in the gastric juice in the stomach has a decided solvent action upon lead chromate. The solvent action of dilute lactic acid solution on lead chromate was demonstrated in the same manner.

A portion of the original 0.2 per cent. hydrochloric acid filtrate was rendered alkaline with potassium hydrate, and then concentrated by evaporation. On acidulating the clear liquid with acetic acid not even the slightest turbidity was produced, consequently the lead was not present in the solution as chromate.

Another portion of the original acid filtrate was warmed, and then treated with hydrogen sulphide, and the resulting lead sulphide removed by filtration. The filtrate was evaporated to dryness, and a portion of the residue was fused in a borax bead. The resulting bead was decidedly emerald-green in color, which was intensified by fusing a small piece of tin foil in the bead. The presence of chromium was thus proven. It was not present in the solution as a chromate, or we should have had a precipitation, as above described, of lead chromate upon the addition of acetic acid to the concentrated original filtrate. Both the lead and chromium must have been present as chlorides.

We would expect the hydrochloric acid of the gastric juice in the stomach to have the same action upon lead chromate as shown above,—namely, converting a portion of the lead chromate into measurably soluble lead chloride and chromic chloride, according to the reaction, $2PbCrO_4 + 16HCl = 2PbCl_2 + Cr_2Cl_6 + 8H_2O + Cl_6$. In this reaction six atoms of chlorine are set free, and, if this reaction occurred in the stomach, one might expect to find a corrosion of the lining of the stomach, due not only to the action of the free chlorine but also to the chromic chloride. It may be remembered that in the experiments on dogs detailed in this paper, there were no evidences of corrosion of the stomach or the intestines. However, the quantity of

lead chromate decomposed by the acid in the stomach is probably very small, and a correspondingly small quantity of chlorine and chromic chloride, not sufficient to cause corrosion, would be produced. Moreover, the liberated chlorine would decompose a part of the organic matter (food) present, combining with hydrogen to form hydrochloric acid. According to Husemann,* the administration of chlorine-water, in doses of from 2 to 10 cubic centimetres, aggregating from fifteen to thirty cubic centimetres per day, diluted with five to ten parts of water, excites the appetite and promotes digestion by increasing the quantity of hydrochloric acid in the stomach.

Granting that the lead was taken into the circulation as lead chloride, it would be immediately acted upon by the sodium carbonate and phosphate in the blood, and be converted into insoluble lead carbonate or phosphate, which might be carried through the capillary blood-vessels and deposited in the tissues.†

Because of the insoluble nature of the carbonate and phosphate of lead, the natural elimination of the metal must of necessity be very slow. It is well known that the elimination of lead from the body is considerably hastened by the administration of potassium iodide. Acknowledging that the lead is deposited and exists in the tissues in the form of the insoluble salts above mentioned, what is the explanation of the marked increase of elimination on administering potassium iodide? Can the potassium iodide have a decomposing action on the carbonate or phosphate of lead with the formation of soluble compounds of lead? To determine whether such action could take place, a portion of chemically pure dry lead carbonate (dried at ordinary temperature) was placed in a test-tube containing a dilute solution of potassium iodide, and the whole, with frequent agitation, kept about ten minutes at the body temperature. On allowing the insoluble material to subside, it was found that the deposit was of a decidedly yellow tint. This yellow tint was ascribed to the presence of lead iodide resulting from the action of the potassium iodide on lead carbonate. The presence in the above liquid of a soluble salt of lead, due to the action of the potassium iodide on the lead carbonate, was proved by filtering off the deposit and obtaining positive tests for lead in the filtrate. Experiments were performed, in the manner just described, with dry lead phosphate and with freshly-precipitated, thoroughly-washed moist lead carbonate, and also with similarly prepared moist lead phosphate, with positive results,—except that the action of the potassium iodide on lead phosphate was not nearly so marked as on the carbonate. As this reaction occurring in the body might be influenced by the sodium carbonate of the blood, the experiments were repeated with the addition of dilute sodium carbonate solution to the liquid containing the potassium iodide and lead carbonate. Lead was found in the filtrate, consequently the presence of the sodium carbonate did not prevent the action of the potassium iodide on the lead carbonate. Thus, it is shown that potassium iodide in solution has an action on the insoluble carbonate and phosphate of lead, with the formation of a soluble lead compound,—double iodide of lead and potassium; and therefore, if lead taken into the system be deposited in the tissues as insoluble carbonate or phosphate, these latter compounds, on the administration of potassium iodide, will be decomposed with the production of a soluble lead compound, and consequently a more rapid elimination of the lead will occur.

It is hardly probable that by examining the tissues themselves we shall ever be able to exactly determine the nature of the lead compound as stored in the body. In attempting to solve the problem we are, at least for the present, obliged to depend upon facts obtained from experiments performed outside of the body.

The above explanation of the deposition of lead in the tissues as carbonate and phosphate appears to be more reasonable than the old theory of the formation and deposition of insoluble lead albuminate, which latter is not compatible with observed facts. Lead albuminate is decidedly more soluble than is generally supposed, and if lead were in the tissues as albuminate, its elimination would be markedly more rapid than is actually observed in cases of lead-poisoning, and little time would be required for its complete elimination.

In case a portion of the lead chloride should escape absorption in the stomach and pass into the intestines, it would be acted upon by the sodium carbonate of the intestinal juices,

* *Handbuch der Gesammten Arzneimittellehre*, 1883, pp. 261 and 263.

† Gusserow (*Arch. f. Pathol. Anat.*, xxxix. pp. 1–174) suggests the probability of the partial replacement of the calcium salts in bone by the deposition of isomorphous lead salts.

and the lead precipitated as insoluble lead carbonate. The sodium carbonate of the intestinal juices would also act upon at least a part of the lead chromate coming as such from the stomach, with the formation of insoluble lead carbonate and soluble sodium chromate. This latter reaction was proven by warming lead chromate, at body temperature, with a dilute solution of sodium carbonate. The undissolved portion of chromate in the test-tube was allowed to subside, and upon the lead chromate, which subsided first, a white deposit, presumably of lead carbonate, was observed. The liquid was filtered, and a portion of the filtrate tested with ammonium sulphide failed to give a reaction for lead. Another portion of the filtrate, when acidulated with acetic acid and treated with lead acetate, gave a copious precipitate of lead chromate, indicating the presence in the solution of a soluble chromate,—sodium chromate.

Thus lead chloride entering the intestinal tract would be converted into insoluble lead carbonate. Likewise the action of the sodium carbonate of the intestinal juices on lead chromate would result in the formation of insoluble lead carbonate, and the simultaneous production of soluble sodium chromate. We might also expect to find evidences of corrosion of the intestinal walls due to the action of the sodium chromate; but, owing to the feebleness of the action of the sodium carbonate, under the dilution existing in the intestinal juices, upon the lead chromate, the quantity of sodium chromate formed would be insufficient to cause corrosion of the intestine. Of course, the greater portion of the lead carbonate, and probably a portion of the lead chromate, in passing down the intestinal tract, would be acted upon by hydrogen sulphide, present in the intestines, and converted into insoluble black lead sulphide.

CONCLUSIONS.

1. Absorption of lead and chromium takes place upon administration of lead chromate.

2. Owing to the insoluble nature of the salt, absorption takes place very slowly.

3. It is most likely that the absorption of lead takes place in the stomach and not in the intestinal tract.

4. The chromium of the decomposed lead chromate would be absorbed in the stomach as chromic chloride, and in the intestines as sodium chromate.

CHEMICAL LABORATORY, MEDICAL DEPARTMENT
UNIVERSITY OF PENNSYLVANIA.

*THE USE OF HYPNOTICS IN THE INSANE.**

BY T. M. LLOYD, M.D., BROOKLYN, N. Y.

IN the treatment of a series of cases of typhoid fever in hospital service in Philadelphia early in my professional career, I was impressed with the results obtained from combining small doses of chloral hydrate, medium doses of potassium bromide, with ordinary doses of morphine sulphate, in controlling the restlessness and wakefulness of delirium, more particularly at night. The plan was to give the combined dose at bedtime, repeating it in one and a half to two hours if sleep did not result in that time, the object being to supplement the first dose before its effects should entirely pass off. In beginning early with the delirium I saw it controlled in three or four days in a number of cases, sleep being secured nightly with 8 to 10 grains chloral, 15 grains bromide, and ⅛ to ¼ grain morphine, repeated when necessary after the interval before mentioned. Subsequently I was led to adopt a similar plan during five years of institution-life among the insane. It was found, however, that, as a regular hypnotic for continuous use in the majority of cases, hyoscyamus in the form of tincture or fluid extract was preferable to morphine to combine with the chloral and bromide.

Larger doses of sleep-producing agents are generally required with the insane. In ordinary wakefulness and restlessness in the chronic forms of mania, melancholia, and dementia 10 to 15 grains chloral, 20 to 30 grains bromide, with 15 to 20 minims fl. ext. hyoscyamus, is sufficient to procure a good night's sleep in most cases. The hyoscyamus was often omitted, or the tincture substituted for the fluid extract, in the milder degrees of insomnia. I have frequently seen the above combination, with 20- to 30-minim doses of hyoscyamus fluid extract, overcome the excitement of acute mania, inducing a quiet, restful night's sleep.

Many times I have obtained success in the use of morphine in place of the hyoscyamus, and, on the other hand, have used all four remedies in combination, with good effects in difficult cases.

I have generally found the doses indicated safe for their respective uses, provided sufficient nourishment is being taken or administered and the patient is not exhausted from protracted and unrelieved excitement. Great

* Read before the King's County Medical Association.

circumspection is required in administering hypnotics to this class of cases, and they should often be accompanied with free stimulation. Indeed, the supporting plan alone sometimes secures the much-coveted result, sleep or quiet and rest.

I regard hypodermic medication as the safest plan in many of these extreme cases, on account of the quicker and more exact effects, enabling one to repeat the dose in a short time if required. In this connection I may mention hyoscyamine.

Its best use appears in controlling or aborting recurrent attacks of destructive violence, with sleeplessness, in vigorous subjects of chronic mania, where it may give sleep when morphine and chloral have failed. My experience led me to regard its continued daily use in doses requisite for calming marked excitement as detrimental to the patients, and to consider it a dangerous drug in conditions of exhaustion. In a few cases I have found small doses of hyoscyamine and morphine combined, and administered hypodermically ($\frac{1}{20}$ grain of Merck's amorphous preparation with $\frac{1}{10}$ to $\frac{1}{6}$ grain of morphine), to produce results superior to large doses of either agent used alone in the same subject, at the same time appearing safer in cases prone to exhaustion.

I believe I have seen life saved in the frenzy of melancholia with impending exhaustion by the administration of ether long enough to overlap the effects of a sedative given hypodermically, thus producing continuous sleep where both plans tried singly had failed. A smaller sedative dose was thus efficient under conditions where large doses would clearly have imperiled life.

I have recently seen a case of acute mania where the family physician wisely used chloroform when the patient appeared in great danger of exhaustion from continued violent effort, with the result of inducing natural sleep. This patient had had administered as large a dose as was safe, with brandy and milk, per œsophageal tube, six or eight hours before, without procuring rest. The anæsthetic effect was apparently the turning-point in the case, and the patient recovered. I have found the combined use of these hypnotics very useful in general hospital and private practice. There are many cases of a mild degree of wakefulness where a very gentle soothing remedy, not strictly a hypnotic, will favor sleep. Bromide of potassium alone will induce sleep in a great many cases, and is particularly useful with children, in irritable states of the nervous system, in teething, during fevers, in controlling night-terrors, etc. Bromide is well borne by children, and the instances are comparatively rare where it may not be used freely as a hypnotic without harm, but, as with all other remedies, some discrimination must be used. I have recently seen in an elderly patient with melancholia, since recovered, 20 grains potassium bromide with 15 grains chloral cause dizziness on awakening and signs of muscular incoordination. In this case 20 grains of chloral alone was free from this effect. In another, 40 grains bromide will produce marked incoordination, making it difficult to walk without support. I have known the continued use of sixty to eighty grains during the day to cause abscesses on two occasions in a subject physically vigorous, of middle age. The bromide distinctly aids its congeners in producing sleep in alcoholic cases. I frequently use the tincture of hyoscyamus or small doses of the fluid extract with chloral and bromide in the wakefulness of fevers, in neurasthenia, and in a variety of conditions, but only occasionally find it necessary to resort to the larger doses of the fluid extract common in the treatment of the insane.

My object in first combining bromide with chloral in typhoid fever was to prolong the quieting effect and to dispense with large doses of chloral, in a disease producing a low state of vitality, and I found morphine useful in this connection, enabling me to secure excellent results with small doses of bromide as well as chloral. Later I found hyoscyamus, from its favorable effect upon the kidneys, and freedom from ill effect upon the secretions in general, an efficient substitute for the morphine in a variety of cases.

To indicate the relative value of some of the newer hypnotics, I have sought replies from some friends of large experience with the insane to the following questions:

First.—What remedy do you regard the purest hypnotic,—viz., that which acts especially upon the higher nerve-centres, producing sleep, and is most free from special and incidental effects upon other organs, the circulation, general secretions, etc.?

Second.—Please enumerate the hypnotics most depended upon in your institution in the order of their relative use.

Third.—To what extent have the newer hypnotics—urethan, paraldehyde, hyoscine, etc.—supplanted the older ones?

Fourth.—What is your experience with chloroform and ether, or other anæsthetic, in

controlling the extreme excitement of acute mania or the frenzy of acute melancholia?

Fifth.—Please indicate your practice as to dosage.

Dr. J. B. Andrews, superintendent of the State Asylum at Buffalo, N. Y., makes the following replies, which are of special value, as he has made reports on the effects of paraldehyde, hyoscine, and urethan in many cases:

"BUFFALO STATE ASYLUM FOR THE INSANE,
"BUFFALO, N. Y., April 23, 1887.

"No. 1. I regard chloral as the purest hypnotic we possess; that it is 'the most free from special and incidental effects upon other organs, circulation, etc.,' of any of the class, without it might be urethan, but the last is not as effective or as certain in its operations as chloral.

"No. 2. The hypnotics we most depend on in this institution are chloral, bromide, morphia, hyoscyamine, the latter of the impure form of Merck, usually given by the mouth.

"No. 3. The newer hypnotics—urethan, paraldehyde, hyoscine—have not supplanted the older ones. They are used occasionally when the other hypnotics fail to produce the desired effect, and in other cases where repeated trials of various remedies are necessary.

"No. 4. I have had no experience with the use of chloroform and ether to control the excitement of mania or the frenzy of melancholia.

"No. 5. I have not had occasion to modify my opinions as regards dosage expressed in the article sent you."

I give also the following specific report upon chloral from Dr. John W. Ward, superintendent State Lunatic Asylum at Trenton, N. J., as it represents the conclusions reached after years of continuous and large observation:

"NEW JERSEY STATE LUNATIC ASYLUM,
"TRENTON, N. J., April 25, 1887.

"MY DEAR DOCTOR LLOYD,—Your favor received, and in reply would state that our hypnotic *par excellence* continues to be chloral hydrate. After using it for fifteen years, we see no reason for changing it for any other. It is simply an hypnotic, and is not an anodyne in any sense. There seems to be an unwarranted prejudice in regard to its use, partly from fear of its exhibition in cases where cardiac complications exist, and partly because of a supposed danger of forming what is called a chloral habit, whatever that may mean. Chloral is not a stimulant. It does not require increased doses after its exhibition for a short time in order to secure hypnotic effects, and how a chloral habit can be formed is a mystery to me. We have had several cases, diagnosed as 'the chloral-habit,' placed under our care. But in *every case*, without exception, it has been associated with opium or one of its preparations, usually morphine sulphate, hence we had to deal with the opium-habit. We have had cases take it for weeks, and in a few cases for months, in 15-grain doses at bedtime every night, and then abruptly withdraw it, and the drug has not been missed, no discomfort of any kind following its withdrawal. This cannot be said of opium or any narcotic. We have always used some caution in its use in cases where cardiac complications exist. It has been given by us again and again in such cases, without any untoward result following. But we always regard it as not to be given without great care in such cases, simply because, I suppose, the journals have reported cases of death resulting from its use when the heart is involved. In delirium tremens it is a very dangerous drug, and I never give it under any circumstances to these cases. A word in regard to the mode of its administration. We always give it freshly dissolved, simply in pure spring-water, and always use a preparation that has not been exposed to the *light* or air. I have ample proof that a preparation that has been thus exposed is unsafe to exhibit, and also, except in very large doses, will not meet the indications as an hypnotic. We give it in doses of 15 grains at bedtime, after the patient is in the recumbent position, and very, *very* seldom does it have to be repeated, and also very seldom are we disappointed in obtaining the result desired. If a preparation is used that has not been exposed as referred to, freshly dissolved in spring-water and given in 15-grain or 20 grain doses, I believe it to be entirely safe and reliable as an hypnotic, and this opinion is based upon its use for fifteen years and to the amount of several hundred pounds; and, when the requirements have been complied with, no untoward or unpleasant result of any nature whatever has in a single case resulted from its use. What the change is that occurs when the drug is exposed for a time to light and air I don't know, but that a change does occur I am, or think I am, entirely certain. The drug then produces burning in the epigastrium, often giddy sensations (vertigo), occasionally almost produces a temporary *dementia*,—a curious lethargic, stupid state, and

does not produce the much-desired sleep. As stated, the dose is 15 grains, never more than 20 grains, and is never associated with the bromides, opium, or its preparations, or with anything else.

"Chloral hydrate is not followed in its administration by any unpleasant symptoms, as constipation, indigestion, headache, nausea, etc., as are most or all of the narcotics.

"2. Chloral hydrate, paraldehyde, bromides (chiefly potassium, hyoscine hydrobromate, and hyoscyamine). Hypnotics depended on in the order of their relative use.

"3. Hyoscine we have given in doses of from $\frac{1}{100}$ to $\frac{1}{60}$ of a grain, *ter in die*, producing weariness and relaxation of the muscles, dryness of the fauces, dizziness, etc., without allaying high maniacal excitement. Paraldehyde, in doses of from 30 to 60 minims, produces calm, refreshing sleep, lasting from three to seven hours. I think paraldehyde a valuable addition to our list of hypnotics, its greatest objection being its taste and the odor which it imparts to the breath.

"4. We have not used chloroform in controlling the excitement of acute mania, but have tried ether in a few cases, and it works admirably well, so long as you keep the sponge to the nostrils, but the paroxysms return when it is withdrawn."

Dr. H. F. Carriel, superintendent Illinois Central Hospital for the Insane, Jacksonville, writes,—

"We regard *chloral hydrate* as the purest hypnotic we have had any experience with. We find *hyoscyamine* useful in cases of periodical mania. Given at the outset of the excitement it produces quiet, and in some cases seems to ward off the maniacal attack.

"We also depend on *opium*, particularly in cases of melancholia, to allay the frenzy, and produce a soothing and quieting effect on the whole nervous system.

"We have used *urethan* to some extent, but with results almost negative. It has not produced sleep in 30-grain doses.

"Some twenty years ago I used chloroform with the idea of controlling extreme excitement in acute mania, but did not find its effects at all lasting.

"I have had no experience with ether or chloroform in cases of melancholia. We continue to administer the fluid extract of hyoscyamus in 10-minim doses.

"We also prescribe bromide of potassium, in 20- to 30-grain doses, in cases of full habit, or where there is some abnormal increase of blood in the brain."

Dr. E. N. Brush, superintendent Pennsylvania Hospital for the Insane, Philadelphia (Department for Males), writes,—

"1. As to the purest hypnotic, as far as my present experience would lead me I should give the preference to chloral hydrate. In insomnia from simple brain-tire, without material lesion, chloral seems to meet the requirements of a pure hypnotic better than any other drug.

"2. The sleep-producing remedies we most depend upon, in their order, are chloral hydrate, hyoscine hydrobromate, sodium bromide, tr. hyoscyamus. (In certain cases electricity, dry rubbing, hot sponging to the spine, or a bowl of hot gruel or beef-tea just upon going to bed does away with the necessity of drugs.)

"3. We do not use urethan or paraldehyde, and have not, except tentatively. Hyoscine about divides the honors with chloral.

"4. I have never used chloroform or ether, as suggested, and have only known of harm from their use in the few cases which have come to my knowledge.

"5. With hyoscine, I commence with $\frac{1}{120}$ of a grain, and, if the desired results are not attained, repeat it once during the night. Some cases have had the dose gradually increased to $\frac{1}{80}$ of a grain, but none higher than that."

GENERAL REMARKS REGARDING SOME OF THE NEWER HYPNOTICS.

Paraldehyde.—All observers agree that its disagreeable taste and the persistent odor it gives to the breath greatly prejudice its usefulness. It is generally regarded as inferior to chloral, although possessing value as an hypnotic, and it may prove useful as a substitute, as it is said not to be contraindicated in cardiac complications.

Hyoscine hydrobromate has been studied by a number of observers. Prof. H. C. Wood, of Philadelphia (January, 1885), has called special attention to the drug. Dr. Chas. P. Henry, of Philadelphia, has recorded effects of the drug in eight cases. Dr. J. B. Andrews, of Buffalo, has reported its use in eleven cases. Dr. Henry M. Wetherill gives the results of his experience of its use for six months in the Pennsylvania Hospital for the Insane. Dr. E. M. Schaeffer, of the Maryland Hospital for the Insane, reports its employment over one hundred times. Drs. Francis L. and Jno. R. Haynes, of Philadelphia, report fifty-seven cases in private practice, in which three hundred and thirty-eight doses

were administered. Dr. P. S. Root, Monroe, Mich., reports untoward effects from $\frac{1}{300}$ of a grain in a debilitated patient. Dr. W. D. Hamaker, Meadville, Pa., reports striking effects of the drug in one case. The reports indicate its value when other sedatives fail in "calming motor excitement of acute and chronic mental disorders in their talkative, active, noisy, destructive, or violent phases." In this class of cases the range of dose may be from $\frac{1}{120}$ to $\frac{1}{30}$ of a grain. Serious symptoms have followed moderate doses, such as nausea, vomiting, anorexia, dysuria, syncope, with small, rapid, irregular pulse, and Cheyne-Stokes respiration. The reports of its use by the Drs. Haynes, of Philadelphia, in private practice are not encouraging for its general employment as an hypnotic, on account of many unpleasant symptoms induced by it.

Urethan.—Introduced by Jacksch, of Vienna, reported upon by Henri Huchard, Dr. A. L. Myrtle (*British Medical Journal*), Dr. Sticker (THERAPEUTIC GAZETTE, March, 1886); Drs. Otto and Koenig, Hospital for Lunatics and Epileptics in Dalldorf; Dr. Rottenbiller, Insane Asylum at Budapest; Dr. Emile Krapelin (THERAPEUTIC GAZETTE, October, 1886); Dr. Geo. H. Savage (Bethlehem Royal Hospital); Dr. J. B. Andrews, Buffalo, N. Y.: "It acts as a genuine hypnotic, causing sleep, which appears to be perfectly similar to the physiological state, but it has not great energy, and is inferior to paraldehyde in cases with much excitement."

Dr. Stickler says, "Urethan appears to be indicated in cases in which the other hypnotics, either on account of their unfavorable action on the heart or respiration, on account of their taste, or for some idiosyncrasy of the patient, have to be reduced or stopped. The minimum dose is 15 grains, and in persons from fifteen years of age upwards this may be increased to 60 grains without danger."

It has been used by Dr. A. L. Myrtle (reported in *British Medical Journal*) in over fifty cases as a sedative and hypnotic, when required in the usual run of every-day practice, and he believes that it will prove of great value in certain cases. He employed it in "general restlessness, sleeplessness, neuralgia, catarrh, certain forms of skin-affection with great irritation, also rheumatism and gout."

Unpleasant effects upon the stomach are reported, nausea, and vomiting.

Jamaica dogwood is uncertain as an hypnotic, but I have found benefit from its use as a day remedy in nervous debility, in soothing nervous irritability, and even some degrees of excitement in mental derangement, and it has seemed in this way to promote sleep as well as directly to enhance the effects of mild hypnotics when combined with them. The doses employed were from ℥ss to ℥ii of the fluid extract.

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*A FEW SUGGESTIONS ON THE TREATMENT OF PULMONARY PHTHISIS, WITH REMARKS ON THE USE OF THYMOL.**

BY DR. EDWARD T. BRUEN, PHILADELPHIA, PA.†

A MEETING of this society seems a suitable occasion to present notes on clinical therapeutics. The facts and conclusions deduced from them will doubtless prove familiar to many, but the therapeutic results in a large number of cases should always possess interest.

Two of the most important elements of morbid processes affecting the pulmonary apparatus are bronchial catarrh and desquamative pneumonia. In the etiology of pulmonary phthisis bronchial catarrh may often be a predisposing factor, and it certainly is one of the most annoying complications of a large class of cases of phthisis. Catarrhal processes in this disease are frequently associated with softening of the inflammatory new formation, which, together with the absorption of pus from cavities, may give rise to a more or less pronounced septicæmia, and thus many of the most unpleasant symptoms of phthisis arise, such as cough, hectic fever, and diminished appetite. When these symptoms obtain, the treatment I am about to detail will prove of considerable value. Climate, personal hygiene, and super-alimentation form the true therapeutic tripod, yet the symptomatic therapeutics possess a distinct value.

The importance of controlling bronchial catarrh in persons predisposed to phthisis can be inferred when we consider the experiments of Prudden, of New York, in connection with the etiology of septic endocarditis. He found that cultures from cases of septic endocarditis might be introduced into the circulation of animals with negative result in the endocardium, but if a probe was introduced through the carotid artery, and the aortic valves injured, immediately infectious valvular endo-

* Read before the Clinical Society of Philadelphia, December 23, 1887.

† Assistant Professor Physical Diagnosis, University of Pennsylvania.

carditis ensued. It seems to me the inference is more than justified that bronchial catarrh will tend to foster the bacillus and other micro-organisms so universally present, and which are doubtless closely intertwined with the etiology and progress of the disease.

The first measure to which I wish to allude is the atomization of certain drugs within a glass receiver, and their subsequent inhalation as a dry vapor. The spray of an ordinary steam-atomizer is unsatisfactory in its results: but little spray penetrates the recesses of the bronchial tubes, while the inhalation of a wet spray seems to induce a continuance of bronchial processes rather than the reverse.

When the atomization of the fluid is developed within a flask, and the spray is forced by compressed air as a vapor from the flask, certain mechanical advantages are secured. The first of these is that the compressed air acts as a continuous force, and the vapor can be inhaled slowly and with the same ease as ordinary air. By varying the tension of compressed air the tendency to inhale the vapor into the deeper portions of the bronchial tree is increased.

The apparatus which is most satisfactory to me is the vaporizer of Codman & Shurtleff, of Boston. This firm supplies an atomizing apparatus placed in a flask, and the atomizing force is supplied from a gasometer capable of retaining air at the pressure of twenty-five pounds. The compressed air can be supplied by other forms of apparatus, as the Burgess apparatus; the essential principle being to use a dry vapor, which must be inhaled under a certain pressure, say from fifteen to twenty-five pounds. I have found great satisfaction in using one of three formulæ:

a. ℞ Carbolic acid, gr. xvi;
Compd. tinct. iodine, ♏xvi;
Glycerin, ℥ss;
Water, ℥ii. M.

b. ℞ Terebene, ℥ss;
Fluid cosmoline, ℥i. M.

c. ℞ Paregoric, ℥iii;
Ethyl iodide, ℥ss;
Chloroform, ℥i;
Fluid cosmoline, ℥ss. M.

The first of these solutions seems to be most beneficial in the form of bronchial and lobular desquamative catarrh, combined with softening and apex cavity. Frequently in such cases the temperature can be promptly reduced within an hour after inhalation. When the treatment has been followed steadily, the effect is to modify the processes of bronchial catarrh, suppuration, and softening, and to lessen cough and expectoration, to diminish night-sweats, and most decidedly to influence the temperature. The creasote vapor sometimes produces a sensation of dryness, or irritation of the bronchial mucous membrane, which may necessitate its temporary suspension.

b. The terebene has a wider field of application. It occasionally proves equally as efficient in the class of cases just mentioned, but is particularly valuable when expectoration is difficult, sputa white and scant, when there is no fever or sweating, and when the cough is very troublesome. These symptoms prevail both in incipient and developed phthisis, especially in chronic phthisis with extensive interstitial proliferation.

When the atmospheric air is influenced by pine forests or creasote vapors, the result is generally very beneficial to subjects of pulmonary disease, no matter what theory may be held as to the means by which the result is obtained. Dr. Loomis, in a recent paper read before the Climatological Society, expressed the opinion that the emanations from evergreen forests are a most important factor in the open-air treatment so generally advocated, and those patients who frequented the charcoal-pits in the evergreen region of the Adirondacks were markedly benefited. Terebene is formed by the action of sulphuric acid on oil of turpentine. It is a bland, oily, clear or colorless liquid, and has been most favorably spoken of when administered by the mouth to patients suffering from divers pulmonary affections. Dr. Murrell* reported one hundred and fourteen cases of bronchial process in which favorable results were secured, but subsequently† his views were less favorable. Lockling reported seventy-two per cent. of cases as relieved by terebene treatment internally administered, with twenty-eight per cent. of negative results. The bad effects of terebene are nausea, headache, vertigo, occasionally burning sensations over the stomach, and frequent micturition. I have commonly found that when administered internally the gastric mucous membrane is injuriously affected, and it is bad practice to use any treatment of phthisis which retards gastric digestion. It is for this reason that the vaporizer is such a useful means of treatment. When the cough is very dry and troublesome the vapor

* *British Medical Journal*, December 12, 1885.
† Ibid., February 27, 1886.

of the iodide of ethyl is soothing, or I have found that the following formula, used on the Yeo inhaler, is very efficient:

℞ Ethyl iodidi, ʒiv;
Chloroformi, ʒi;
Tr. opii camph., ʒiii. M.

Sig.—10 to 20 drops every half-hour for one or two hours several times daily.

I have used the foregoing formula sufficiently often to enable me to speak with precision as to its value, but I have also used the same apparatus in a number of cases with other combinations, such as fir-wood oil, one part; and fluid cosmoline, two parts; or the following:

℞ Tr. iodinii comp., ♏vii;
Tr. conii, ♏xv;
Glycerinæ, ʒiv;
Aq., ℥iv. M.
Use in vaporizer.

℞ Acid. carbolic., ℥i ʒvii;
Sodæ biborat., ʒii;
Glycerinæ, ℥ss;
Aq dest., ad ℥iv. M.
Filter and use in vaporizer.

The Bergeon treatment will prove valuable as a resort when the foregoing plans of treatment prove unsatisfactory. The effects which I have claimed for the inhalations can be produced by Bergeon's method properly carried out. My own experience with this plan of treatment I have detailed elsewhere. The time required to administer the gas militates against the general adoption of the treatment, and besides this the method seems very obnoxious to the patients, and they are commonly unwilling to submit to a disagreeable plan of treatment, which, after all, will only antagonize certain symptoms.

The Bergeon treatment was the means of convincing me of the value of the water of the Red Sulphur Spring of Virginia as a remedy for bronchial catarrh. It is not so strongly impregnated with sulphur as many sulphur waters, and it is, therefore, more acceptable to the stomach. From eight ounces to a pint of the water should be drunk during the twenty-four hours, and the results are certainly gratifying. The water is especially useful in chronic bronchitis, and, indeed, the remedies I have named are all as useful in subacute or chronic bronchitis as in the bronchial processes complicating phthisis.

In connection with the foregoing I commonly employ iodoform and creasote, unless the state of the digestive organs forbids.

The former substance I commonly give in compressed pills, usually in the following combination:

℞ Iodoformi, gr. ¼;
Acid. arseniosi, gr. $\frac{1}{40}$ to $\frac{1}{60}$;
Pil. ferri carb., gr. i;
Ext. cannabis ind., gr. ½;
Quiniæ sulph., gr. i. M.
Ft. pil. 100.

I have tested the combination so often that I feel justified in recommending it. Cannabis indica is incorporated in the pill to allay cough, but sometimes the full physiological action of the drug is very prompt, and necessitates its withdrawal. Cannabis indica in ½-grain doses three times daily is one of the best agents for the treatment of the neuralgic chest-pains which are so annoying in phthisis. Creasote is more liable to disturb the stomachic digestion than iodoform, indeed the latter drug has a tendency to diminish gastric irritability. I incline to think the use of creasote will diminish bronchial catarrh and diminish the process of suppuration in bronchial cavities.

The use of creasote in phthisis has received considerable attention abroad. Pure beechwood creasote is considered the most valuable preparation. I have found it of considerable value, though I am not prepared to claim as much for it as for the before-mentioned pill. When administered it should be in combination with Phillips's emulsion of cod-liver oil, a preparation which admits of palatable mixture with milk or cream. My habit has been to give 3 drops four times daily, and I have found that these doses may be continued some weeks without unpleasant result.

In cases in which acute bronchial attacks complicate phthisis, the salts of ammonium may be serviceable, but often are contraindicated, because they tend to unfavorably affect the appetite and modify gastric and intestinal digestion.

I have in these cases used the vapor of freshly-prepared ammonium chloride. The Enterprise (Blair & Sons, Philadelphia) inhaler is a convenient apparatus. It consists of a receiver, into which is poured some rose-water, and ten to twenty drops aq. ammonia are to be added. A small receiver at the top of the jar is next to be filled with a measure of hydrochloric acid. The cup containing the acid is connected with the ammonia solution by a bent glass tube, and above the level of the solution of ammonia a bent tube forming the mouthpiece is placed. By suction of inspiration enough acid may be carried over to liberate the vapor of ammonia, which can be inhaled.

Fir-wood oil, creasote, cannabis indica, and many other substances can be used with fair results in this apparatus, but the use of the ammonia vapor deserves especial mention.

Among the many varieties of local treatment of catarrhal affections of the larynx and pharynx, especially when attended with ulceration, I have found the liberal use of lactic acid most satisfactory. I employ the drug either as a spray by means of the Sass apparatus, or the ordinary atomizer. At first I employ a saturated solution reduced one-half strength, and gradually increased to full strength if required. It may also be applied with a camel's-hair brush or fine sponge to the affected parts. The value of iodoform is well known. Sometimes an application of

℞ Ammon. mur.,
Chloral hydt., āā gr. xx;
Hydrarg. bichlor., gr. i;
Glyc. et aq., q. s. ℥i. M.

is very serviceable. The solution can be applied by means of a camel's-hair brush. In cases of pharyngeal and laryngeal ulceration complicating phthisis a course of iodide of potassium, 10 or 15 grains three times daily, has seemed to hasten cure when used in association with the foregoing measures.

Finally, I have a word to add in connection with the treatment of diarrhœa complicating phthisis. Some months ago Dr. F. P. Henry published in the *Medical News* of Philadelphia some clinical experiments with thymol in diarrhœa. He was particularly pleased with the drug in subacute and chronic catarrhal enteritis. The dose which he employed was 5 grains, which was administered in 2½-grain pills, and as much as thirty grains was recommended in the twenty-four hours. He also particularly recommended a trial of the drug in the diarrhœa of phthisis. I have used the thymol very advantageously in the diarrhœa of phthisis, as well as in other cases of diarrhœa due to chronic catarrhal enteritis.

The following abstracts from my case records were prepared for me by Dr. A. A. Stevens, resident physician in the Philadelphia Hospital, in which the trial of the treatment was mostly made:

C. R., 60 years of age; admitted September 5, 1887, with phthisis complicated with diarrhœa. He was given milk diet, and bismuth in 30-grain doses every two hours without benefit. On the 7th lead and opium pills were substituted for the bismuth, and these relieved him to some extent, but the diarrhœa soon returned, and was accompanied with considerable pain in the abdomen. On the 21st lead and opium pills were omitted. He was given a selected house diet and thymol. In forty-eight hours the diarrhœa had entirely disappeared.

I. A., admitted September 23, 1887. Previously healthy and well nourished. His diarrhœa began six weeks ago, and at the time of his admission he had as many as fifteen stools in the twenty-hours. The stools were thin and slimy, but contained no blood, and were unattended with pain. When admitted he was given a milk diet and lead and opium pills, which failed to relieve him. On the 28th, five days after admission, he was given in the course of twenty-four hours thirty grains of thymol in pill form, since which time he has had from three to four passages a day, and in five days he was entirely well.

M. A., admitted September 24, 1887. Condition healthy up to three months ago, when he was seized with diarrhœa. He has had as many as fifteen passages a day, which are thin, contain mucus, are attended with nausea and vomiting, and griping pains in the abdomen. When admitted he was given a milk diet, with lead and opium pills, which relieved him but slightly. On the 27th he was given thymol, thirty grains, in pill form, in the twenty-four hours. In twenty-four hours the pain had entirely disappeared, with it the nausea and vomiting, and the stools reduced to seven a day. At present he has three or four passages a day.

G. D., 45 years of age. Admitted September 26. He has had diarrhœa at intervals ever since the war. His present attack has lasted ten weeks. He has from seven to ten stools a day, which are thin, and contain much mucus and undigested food. He has neither nausea nor vomiting, and complains of but little pain in the abdomen. On admission he was given a milk diet and thymol, as in the other cases. At present he has three or four passages in the twenty-four hours, which are nearer the normal in character.

I. B., age 40; admitted on the 8th of this month. General health has always been good. Diarrhœa began four months ago, since which time he has had from eight to ten stools a day. The stools are thin and watery, and are free from blood. On admission he was given a milk diet and twenty grains of thymol in pill form in the twenty-four hours. In two days the number of passages was reduced to two in the twenty-four hours.

The foregoing have been selected from a

series of twenty-five cases, and I believe we possess an important therapeutic agent in thymol. The drug, however, acts chiefly as an antiseptic, and by checking fermentation the tendency of the intestinal contents to excite peristalsis is diminished. Sometimes this antiseptic action is all-sufficient, and rest and suitable feeding will be quickly followed by cure. But very often the addition of some of the remedies usually employed in catarrhal enteritis may be required, such as nitrate of silver or bismuth. My experience, however, inclines me to believe that cases of diarrhœa yield more quickly when treated with thymol in addition to other remedies, and that thymol will enable one to terminate successfully diarrhœas which have not yielded to other plans of treatment. I have never found it necessary to exceed thirty grains in the twenty-four hours.

PYRIDIN AS A CARDIAC EXCITANT.

Dr. de Renzi states, in the *Riv. Clin. e Terap.*, 3, 1887, that he has found pyridin to be an active cardiac excitant. He draws his conclusions regarding the action of the drug from the observation of seven cases which were in his own clinic.

1. Pyridin, when given internally in daily doses of 6 to 10 drops taken in water, is well borne, and may be gradually increased to 25 drops, or even more.

2. The drug increases markedly the cardiac systole and lessens the feeling of oppression and fear.

3. The number of cardiac pulsations lessens, after the use of pyridin, simultaneously with the number of respirations.

4. By the use of pyridin the pressure of blood in the arteries is increased. After its use, by means of the sphygmomanometer, the arterial pressure was always found to be greater than before.

5. From numerous graphic tracings it was seen that the ascending line of the curve became much higher; also that the pulsations became much more regular. In one case, which had been marked by an arhythmic pulse, pyridin caused this to entirely disappear, and the pulse became normal and perfectly regular.

6. Pyridin has conquered angina pectoris (?), as it relieves the attacks more quickly and completely than any other remedy. In asystole it is also of great value, as it acts quicker than digitalis, and cumulative effects need not be apprehended.

VIBURNUM PRUNIFOLIUM.

Dr. Auvard, in the *Gaz. Hebdom.*, No. 34, writes of his observations regarding the action of viburnum prunifolium as follows:

Three preparations of this drug are principally used,—the fluid extract, the soft extract, and the tincture. Dr. Auvard's experiments were made with the tincture. This (one to five) can be given in doses of 100 to 150 drops in twenty-four hours. The active principle seems to be viburnin, which was first discovered by Van Hallen, but as yet it has not been experimented with. Indications for the use of viburnum in threatening abortion are the same as in the prophylaxis of the abortus.

According to Auvard, the drug should not be used in the following cases:

1. When the fœtal membrane is torn and the water has been discharged. However, when during the sixth or seventh month of pregnancy there is a rupture of the membrane but there are still hopes of preventing a miscarriage, viburnum may be used.

Auvard cites a case of a young primipara, in the sixth month of whose gestation there was a rupture of the fœtal membrane, and the woman had for five weeks been losing large quantities of amniotic fluid. The drug had been used all the while, and in consequence the woman was able to make a three hours' journey, and not until three hours later did she give birth to a living child.

2. Viburnum should never be used if the fœtus is dead.

3. When labor is well under way and the birth expected momentarily, or if a miscarriage has commenced.

4. When the mother has a severe illness which contraindicates the causing of any delay in the birth.

Dr. Auvard cautions practitioners to abstain from using viburnum for severe afterpains until the uterus has been washed out.

In gynæcology viburnum is valuable in dysmenorrhœa. It also has a highly beneficial effect on colic of the bowels accompanied by diarrhœa. Viburnum is preferable to opium in such cases for the following reasons: it is not toxic, it does not cause constipation, and its action is a more local one.

Viburnum does not seem to have any injurious effect on the stomach, and is always well borne.

Dr. Auvard advises the use of the drug in the following formula:

℞ Tincturi viburni prunifolii (1 to 2).
S.—10 drops every hour until the pain has ceased.

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EDITED BY
HORATIO C. WOOD, M.D.,
AND
ROBERT MEADE SMITH, M.D.,
PHILADELPHIA.

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Leading Articles.

HYPODERMIC MEDICATION.

THE advantages of the hypodermic method of administering medicine when promptness of action is required are beyond cavil. As is well known, the objections to the method are twofold: first, the danger of the production of local inflammation and abscesses; secondly, the possibility of throwing the whole mass directly into a vein and having it swept in concentrated form into the heart or a nerve-centre. The last of these two dangers is a remote one, and yet we have seen the injection of a sixth of a grain of morphine followed inside of a minute by a complete unconsciousness and collapse, with arrest of respiration, dropping of the jaw, and apparent death, a condition from which the patient was only rescued by the most strenuous efforts. The danger of such an accident can be greatly lessened by withdrawing the point of the needle a little after it has been plunged into the tissue. It is especially in the production of local irritation that the danger of the hypodermic syringe lies. Not only have abscesses been frequently produced, but in not a few cases fatal tetanus has resulted from the administration of an irritant substance. There can be no doubt that this difficulty can be largely overcome by certain precautions which are very frequently neglected by medical practitioners. In the first place, only under urgent circumstances is the doctor justified in using hypodermically substances which are very irritant, such as sulphate of quinine. When, however, any such substance is employed, it is of the utmost importance to see that every particle of it is dissolved, and if the substance be of such nature that it is precipitated by alkalies, an acid should be present in the solution in water to prevent precipitation by the juices of the cellular tissues. An irritant substance which is rapidly dissolved and taken up from the part may produce at first smarting and pain, but ought not to make any permanent irritation. To prevent any possibility of the injection of minute solid particles, the hypodermic solution should always be filtered.

More important, however, than these considerations is the law that even in the use of the most innocuous substances hypodermic injections should be given with the most absolute antiseptic precautions. Much has been said in regard to the spoiling of the solutions. No solution which has undergone any decomposition or contains any growth should be employed at all; in fact, according to our thinking, the solution should always be made fresh. It should always be prepared with boiled or distilled water, preferably with freshly-boiled water, and should always have added to it carbolic acid. One-half drop of carbolic acid thrown into the cellular tissue, so far from increasing the pain, has a distinct power in relieving such pain by the virtue of the anæsthetic influence which it exerts upon the nerve-filaments. It has no perceptible constitutional influence, and it has a very distinct power in preventing the formation of abscesses. Fifteen minims of a watery solution, containing half a drop of carbolic acid, is really a disinfecting solution, or rather an antiseptic solution, and if solutions must be made for use some time afterwards, they should contain a drop of carbolic acid with a drop or two of glycerin to every fifteen minims. It must be remembered, however, that certain alkaloids will be thrown out of their solution by the addition of too much glycerin. When solution of the medicinal substance is distinctly favored by glycerin, as in the case of extract of ergot, three or four drops of the glycerin may be added. It must be remembered that the hypodermic

needle goes from patient to patient, and it is thoroughly capable of carrying poison within and without it. The whole syringe should, indeed, always be carefully disinfected with a strong solution of carbolic acid before use. The method of giving the hypodermic injection has much to do with its local effects. If the solution be thrown directly under the skin, by raising and tearing the skin away from its attachment it may interfere very greatly with the supply of blood to the surface, and thereby produce local trouble. The solution should, therefore, always be thrown deeply into the tissues, where it may readily diffuse itself, and have no power of affecting the blood-supply. The syphilographers of Europe have employed injections of calomel, and have found that the best portion of the body for their purposes is the buttock, about one and a half inches behind the great trochanter, in the neighborhood of the groove, which is plainly visible in persons who are not too fat. When there is any doubt as to the local effect of an injection, this should be the place of selection.

THE ACTIVE PRINCIPLE OF SCOPARIUS.

OUR readers know, no doubt, that in the ordinary Broom, or Scoparius, Stenhouse discovered two active principles. To one he gave the name of scoparine and to the other sparteine. The first of these is a glucoside, whose physiological and therapeutical properties have not as yet been sufficiently studied, but which probably represents the purgative and diuretic influence of the drug. Sparteine is a liquid alkaloid, yielding with sulphuric acid a greenish crystalline salt freely soluble in water. According to the early experiments of Mitchell and Schroff, this alkaloid causes in rabbits deep sleep, with convulsions. The more recent investigations of De Rymon and Griffe show that there are two distinct stages of the poisoning. The first of these is characterized by trembling, incoördination of the movements, irregularity of gait, augmentation of reflexes, clonic and tonic convulsions, embarrassment of the respiration, acceleration of the pulse, and enfeeblement of the heart; during the second stage there is gradual enfeeblement of all the functions, the respiration becoming more and more depressed, and death, preceded by convulsions, occurring from asphyxia, due to paralysis of the respiratory centre. Fick found that life may be prolonged in the poisoned animal for a length of time by artificial respiration.

Dr. Fick (*Archiv f. Exper. Path. und Pharm.*, 1887) found that sparteine affects the cerebrum both of frogs and mammals, and is therefore a narcotic, although its paralyzing action upon the spinal cord is dominant. The same observer noted that it has a direct paralyzing action upon the motor nerves. This alleged influence on the motor nerve-trunks appears, however, to be disproven by De Rymon (Thèse, 1880) and by Griffe (Lyon Thèse, 1886), who find that neither the motor nor the sensory nerves are affected by the alkaloid; indeed, since Fick himself states that the arrest of respiration which produces death and the loss of reflex activity are chiefly of centric origin, and in one place affirms that the motor nerves after death react to a faradic current, it is evident that sparteine has little or no influence upon the peripheral nerves. Its action upon the muscles is also very feeble. It does not destroy (De Rymon and Griffe) the muscular excitability, even when applied locally, although it has some influence in diminishing the excitability and in lengthening the duration of the latent period. The action of sparteine on the heart appears to have been first pointed out by Dr. Laborde (*Soc. Biolog.*, November 21, 1885). He found that in the frog and in the mammal the alkaloid produces an enormous increase in the size and height of the cardiac wave. More recently the action of sparteine upon the heart has been investigated by Griffe (Nancy Thèse, 224, 1886), by Garand (Lyon Thèse, 317, 1886), and by Masius (*Bull. de la Acad. Royal de Med. Belg.*, 1, 218). Griffe finds that in the frog it produces in the isolated heart an extraordinary persistence of contractility; that after moderate doses there is acceleration of the pulse, from paralysis of the pneumogastric centres, which is followed by a slowing of the heart; and if the dose has been sufficiently large the slowing is primary. In mammals small doses cause acceleration of the pulse without change of arterial pressure. After somewhat larger doses acceleration of the pulse is followed by slowing of the pulse. If the amount of the poison is sufficient there is a primary slowing of the pulse, with a gradual fall of the pressure, although the cardiac waves are extremely large and full. Masius, in experiments made upon dogs, found that small doses accelerated the heart-beats, the wave at the same time becoming more ample, the pressure not being affected

After still larger injections the pulsations became more and more full and regular, but the pressure did not undergo any distinct change. In poisoning during the period of asphyxia the pulse-waves are enormous in size. Fick, Griffe, Garand, and Masius all note that small doses weaken and larger doses paralyze the peripheral portions of the pneumogastric nerves. Fick affirms that in the heart, under the influence of sparteine, diastolic arrest cannot be produced by the use of muscarine or other means, and believes that the governing centres in the heart are paralyzed. It is almost certain that sparteine acts upon man as upon other mammals, although no cases of poisoning by it have been recorded.

According to Legris, in doses as high as 25 centigrammes sparteine does not produce any perceptible influence in the healthy man upon the brain or spinal cord, although doses of 30 centigrammes and over may cause vertigo, headache, palpitations, formications in the extremities,—the only inconvenience. After 40 centigrammes, Griffe noticed very decided pain in the heart, with sensation of heat and redness in the face, and loss of power in the legs. The symptoms commence about twenty minutes after the absorption of the remedy, and reach their maximum in about four or five hours.

Sparteine does not appear to represent the diuretic influence of scoparius. In the experiments made upon rabbits by Griffe the excretion of urine was absolutely decreased under its influence. While statements of clinicians appear to be in accord in affirming that although in some cases of cardiac disease the urine has been manifestly increased, in the majority of cases no such result has been produced, and it is probable that the increased diuresis was a secondary to the regulation of the circulation. In some cases intestine irritation, as indicated by diarrhœa, has been produced in man by sparteine.

The results of the physiological study of sparteine indicate that it is a powerful direct stimulant to the heart, which has no effect, at least in therapeutic doses, upon the vaso-motor system. Its therapeutic properties have been studied by a number of clinicians. Professor Sée states that in his experience it is of very great value in cardiac affections in increasing the force of the cardiac beat and of the pulse, and especially in producing regularity in cases of irregular cardiac action. For the latter purpose he affirms that it is the most powerful remedy known. The action of the drug, according to the same observer, is made manifest within an hour after its ingestion, and is perceptible two or three days after the cessation of its use. The value of the remedy in the treatment of cardiac affections has been confirmed by Garand, Roland (*Le Poitou Méd.*, 1887), and by Voight (*Med. Chron.*, April, 1887). Hans Leo (*Zeit. für Klin. Med.*, 1887, 142) finds, however, sparteine to be of very uncertain power, and the conclusion arrived at by Hierro Stoessel (*Centralb. Therapie*, 1887, 163) that sparteine is inferior as a heart-tonic to digitalis, and only to be employed as a *succedaneum* to that drug, probably correctly indicates the scope of its influence for good. It has the advantage of acting very quickly. The commencing dose should not be more than the $\frac{1}{25}$ of a grain, although probably larger amounts will have to be given to produce a decided effect.

OXYTOCIC REFLECTIONS.

THE latest botanical researches indicate that all the different forms of ergot belong to one species. The ergot of Diss, an Algerian reed, has appeared to some extent in European commerce, and is said to be employed by the Arabs for the same purposes as is our ordinary ergot, but, according to Mr. Lalamand, it is twice as strong as ergot of rye, less hygroscopic, and less apt to be attacked by acari. It is also affirmed that the ergot of the wild reed of Minnesota was formerly used by the Indians inhabiting that region for the purpose of producing abortion. Moreover, it would appear that the ordinary smuts, or Ustilagineæ, resemble true ergot, which belongs to another great class of the fungi, in their physiological powers. In the *Medical News*, November 5, 1887, Dr. Dorland states, as the result of his experience in the Philadelphia Hospital with parturient women, that from twenty minutes to half an hour after the ingestion of a sufficient amount the uterine pains increased in frequency and severity and duration, following each other in rapid succession, with a decided intermission between each. He claims that there is no tonic spasm of the uterine muscles such as is produced by ergot, and that there are never, after the birth of the child, hour-glass or other irregular contractions. The preparation which he used was a carefully-made fluid extract, given by the mouth in doses of from 1 to 2 drachms repeated at intervals, or hypodermically in doses of 10 to 15 minims.

In this connection it is allowable to notice that in the *Medical News* of November 5, 1887, Dr. T. Hulme reported a case of alleged acute ergotism which followed the taking of a drachm of the fluid extract of ergot. The symptoms were a swollen, pallid, anxious countenance, shallow and frequent respirations, with swollen extremities and hands, the abdomen enlarged, the pulse frequent, weak and irregular, the pupils equally dilated, and the vision indistinct. There was also nausea and dizziness. According to our thinking it is very certain that these symptoms were not directly produced by the ergot, but were the result of gastric irritation, which in turn was caused by the ergot.

EXPERIMENTS ON PERISTALSIS AND THE ACTION OF VARIOUS LAXATIVES.

AN interesting account of a series of experiments made upon dogs with reference to the peristaltic movement of the bowels and the actual effect of various laxatives and cathartics appeared in the *Deutsches Archiv für Klinisches Medicin* (vol. xl., 1887). The experiments were conducted by Dr. Julius Hess, according to Tappeiner's method. As this method is both original and exact, a short explanation of it will not be amiss.

An artificial fistula should be made in the stomach in such a way that the opening should only be a few centimetres from the pylorus. It will now be easy, in a dog operated upon in this manner, to pass a rubber baloon or bulb, which should be moderately inflated (twenty to thirty cubic centimetres), through the pylorus and into the duodenum. The rubber bulb should be attached to a small rubber tube. This tube should be long and divided into centimetres or inches. After the empty bulb has been inserted into the duodenum a certain amount of water should be introduced into it by means of the rubber tube. It will now be observed, after a sufficient quantity of water has been injected, that the rubber tube is gradually being drawn into the opening of the fistula; this, of course, is due to peristaltis. Now the movement of the bulb in the bowels may be carefully watched by observing the metrical divisions on the rubber tube. This mode of procedure does not alone allow the experimenter to study the peristaltic movement, but by inflating the bulb, and so causing a temporary obstruction, one portion of the bowels may be isolated from another. Further also the strength of the peristaltic movement can be accurately determined by letting the rubber tube pass over a small wheel or pulley and hanging weights on the end of it.

By carefully adhering to the above method Dr. Hess's experiments resulted in the following important discoveries:

1. The peristaltic movement does not usually begin at the pylorus, but somewhat farther down. In the colon the movement is slower than in the small bowel, and at night is much slower than during the day, indeed, ceases almost entirely.

2. Sodium sulphate, castor oil, senna leaves, and croton oil all increase the peristaltic movement. The last-named drug also increases the strength of peristalsis.

In order to still further ascertain the exact action of various laxatives, they were given to the animal in such doses as would insure diarrhœa. The drugs were always administered through the fistula of the stomach and injected directly into the bowels. The proper dose being determined, the animal was given several days' rest. Then the rubber bulb was again inserted and allowed to pass down to a certain part of the bowels, and then inflated so as to isolate the bowel below the bulb; the rubber tube was then fastened on the outside so as to prevent the bulb from slipping. Then various drugs were administered in doses which had previously caused diarrhœa, but now no diarrhœa was observed, although the drugs were given ample time to act. The bulb was then allowed to collapse, and immediately, in almost every case, diarrhœa set in. The author therefore concludes that these drugs act directly upon the mucous membrane of the bowels as they come in contact with it, and that as long as they do not come in contact with any portion of the bowels the peristalsis of that portion was not affected. The drugs experimented with in this case were sodium sulphate, castor oil, calomel, senna, croton oil, colocynth pulp, and gallic acid.

A NEW SURGICAL OPERATION FOR CANCER OF THE STOMACH.

THE operations which have been practised for the treatment of carcinoma of the stomach are pylorectomy, or excision of the diseased pylorus, and the reattachment of the duodenum to the stomach; gastro-enteros-

tomy, which consists in establishing a communication between a healthy portion of the stomach and an adjacent coil of the small intestine, the diseased tissue of the organ not being interfered with; and digital dilatation of the pylorus after gastrotomy. To this list Dr. Augustus C. Bernays, of St. Louis (*Annals of Surgery*, December, 1887), has added a fourth surgical procedure which he has devised for the relief of this condition, and which he has practised in two cases with very encouraging results.

The operation which he performed in the cases above mentioned is based on the fact that the majority of all cases of cancer of the stomach have their origin near the pylorus, and have a tendency to grow towards the lumen of the stomach; for in the early stage of carcinoma of the stomach the mucous membrane is the seat of the disease, the submucous and loose connective tissue is next attacked, and only in the later stages are the muscular and serous coats of the organ invaded by the neoplasm. These facts are said to hold good, especially in cases of scirrhus and medullary cancer, while colloid cancer, which is the rarest form, seems to attack the submucous, serous, and subserous tissues almost simultaneously.

It is upon this pathological observation, that the more common forms of cancer of the stomach originate in the mucous coat inside of the muscular layer and grow towards the lumen of the organ, that the author has devised his operative procedure, which consists in first performing gastrostomy, after which the cancerous or other growths are removed from within the stomach by means of curettes or other suitable instruments. He cites the well-known fact that patients suffering from carcinoma of the rectum and uterus are frequently saved from the exhaustion following the profuse hemorrhages which accompany this affection, and are often kept in a comfortable condition for months, or even years, by repeated curetting of these growths, and he argues that the same procedure is applicable to cases of carcinoma of the stomach.

The author reports two cases in detail in which he performed this operation,—first exposing the stomach through an incision in the abdominal walls, then opening the stomach and stitching the edges of the incision in the organ to the edges of the abdominal wound; in other words, performing gastrostomy. He then completes the operation by attacking the growth with the finger and curette and removing as much of it as is possible. In one case there was free hemorrhage, which was controlled by the injection of cold water, and in the other case the hemorrhage was insignificant. It is recommended that no attempt be made to close the gastric fistula, as a second curetting may be required if obstructive symptoms develop, and it can then be easily accomplished, as was done in one of the cases, through the fistula a few months after the original operation; the patients, moreover, experienced little annoyance from the escape of food. The operations reported by the author were followed by no untoward results, and the patients were comfortable for a period of six months while they were under observation.

The use of the curette in cases of carcinoma of the stomach, we think, is attended with some danger when we consider the irregular distribution of the growth and the thinness of the walls of the stomach, for we have seen its use, in skilful hands, in cases of cancer of the uterus and rectum, followed by accidental perforation of the walls of the growth with a fatal result.

The ultimate result of all cases of cancer of the stomach is such, and the symptoms arising during the course of the disease are so distressing in their nature, that any operation which looks towards the prolongation of life, and at the same time keeps the patient in a condition of comfort, should be carefully considered.

The author does not claim that the operation which he has described is applicable to all cases of cancer of the stomach, but to properly selected cases, as he points out, and we are inclined to think that in such cases and in cases of benign growth it would be a feasible procedure, and one which would expose the patient to less risk than pylorectomy or gastro-enterostomy, provided great care was exercised in the use of the curette. All operations which have been brought forward for the relief of this condition may be said to be still on trial, and their value can only be proved by accumulated experience, and as regards the operation of Dr. Bernays, the number of cases in which it has been tried is, of course, too few, and the time during which the cases were under observation is too short, to warrant any positive deductions as to its value, but its more extended application may show that it is safer in its performance and is followed by better results than the previously recognized surgical procedures employed in the treatment of this affection.

WHOOPING-COUGH.

ALTHOUGH few diseases are more frequently met with than whooping-cough, in few are the results of treatment more unsatisfactory, and until the true pathology of the disease is more firmly established but little can be expected from therapeutics.

For the past few years especial attention has been directed to the conditions of the throat in whooping-cough, as determined by laryngoscopic examination.

Unfortunately, however, the observations of Drs. Bedn, Rehn, Meyer-Hueni, and Rossbach (*Arch. f. Kinderheilkunde*, December, 1887) are quite contradictory. Dr. Otto v. Herff's monograph is undoubtedly one of the most complete and interesting publications on this subject. His experiments were made upon himself while suffering with whooping-cough, and they coincide with those of Dr. Meyer-Hueni.

In a summary of his observations the author says,—

1. That during the whole course of the disease there is a superficial inflammation of the trachea as far down as its bifurcation. This inflammation amounts only to a slight catarrh during the first stages of the disease. During the convulsive stage it is most severe and extensive, but lessens gradually during convalescence. The frequency and severity of the cough is always in proportion to the inflammation.

2. The intensity of this inflammation was different in different parts of the respiratory tract. It seemed most severe in the mucous membrane of the arytenoid, Santorini, and Wrisberg cartilages, and especially in the interarytenoid region, and in those parts between the rima glottidis. The posterior wall of the larynx also seemed to be greatly affected, and also the under surface of the epiglottis. The lower part of the larynx, especially in the infraglottic region, and the entire trachea down to its bifurcation, were markedly hyperæmic. The upper portion of the larynx was scarcely affected at all. The vocal cords remained intact. During the stadium decrementi the hyperæmic symptoms were seen longest in the interarytenoid region.

3. Laryngoscopical examinations were made during paroxysms of coughing, and it was observed that a small quantity of mucus was always on the posterior wall of the larynx. If by forcible expiration this mucus could be removed, the paroxysm would cease.

4. During the "convulsive stage" of the disease, if the interarytenoid space, especially the lower portions, were touched with a sound, immediately a violent paroxysm of coughing would ensue. The same thing would occur when the under portion of the epiglottis was touched, although the paroxysm was less severe. Any other portion of the larynx could be touched without causing a paroxysm of coughing, or, even if it did cause slight coughing, it was never of the "whooping" kind.

As the inflammation of the mucous membrane decreased, the convulsive character of the cough, caused by touching the larynx with a sound, diminished.

Dr. v. Herff considers it most important that further researches should be made in order to ascertain whether or not, in every epidemic, the interarytenoid region and the under portion of the epiglottis are the principal seats of inflammation, or whether, as Rossbach affirms, other portions of the respiratory tract are similarly affected.

As to the treatment of whooping-cough volumes might be written, as almost every practitioner has his own favorite prescription. We will, therefore, confine ourselves to the latest treatment and newest remedies that have been used in this disease.

In the *Courrier Médical*, No. 28, of last year, Dr. Guerder speaks of having found great benefit result from the use of powdered boric acid and burnt coffee, which he blew into the nose. Later he also used powdered resin of benzoin. He considers this treatment far superior to a mixture of syrup of belladonna and bromide of potassium, which previously he had always used. Out of thirteen cases treated with the mixture three turned into intercurrent pneumonia, and two died, while all the cases treated with insufflations of the above-named powder terminated favorably. Dr. Guerder cites twenty-eight cases which he has treated in this manner with marked success. Such symptoms as vomiting, nose-bleeding, and nasal catarrh were speedily relieved ; also the number and intensity of the paroxysms was soon decreased.

In three cases of children who were still in the catarrhal stage of the disease, but who, being in constant contact with other children suffering with whooping-cough, must have been sickening with the disease, the insufflation of the powder acted as a direct abortive, and the disease failed to develop. Dr. Guerder does not alone recommend this treatment on account of its efficacy, but also on account of its harmlessness.

Still more recently newer remedies have been tried with varied success. Some time ago (November, 1886), in the *New York Medical Journal*, Dr. Carr spoke of the great benefit which, in many cases, he had seen derived from painting the larynx with a solution of cocaine.

In the December number of the *Lancet* of the same year, Dr. Mohn speaks of the necessity of thoroughly disinfecting the room which the patient has occupied during the disease by burning sulphur in it.

In an October number (1886) of the same journal, Dr. Nettier speaks of the value of syrup of squills in whooping-cough. Under the use of this drug he says he has often known the disease to completely disappear in a few days.

The practice of blowing quinine into the nose also seems to have a very good effect. Dr. Bachem, in the *Centralblatt für Klin. Med.* (No. 24, 1886), recommends it most highly, and cites several severe cases where its use resulted in speedy recovery, and the *Archiv für Kinderheilkunde* (vol. ix. Part ii., 1887) speaks of two hundred and fifty cases which were successfully treated by this method. The quinine was insufflated by means of a small glass tube.

Dr. Suckling, in the *British Medical Journal*, advocates the internal use of carbolic acid, and cites twenty-three cases in which it had been used, twenty of which recovered in two weeks. Cory also recommends carbolic acid. Several authorities, however, condemn its use, claiming that even small doses are dangerous for children.

From the above various remedies for whooping-cough, each of which is considered "the best" by their several advocators, it would be difficult to fix upon any one treatment. This disease is, however, most important as well as interesting, and surely its treatment deserves our careful study. We would especially call attention to the promising results obtained by Dr. Griffith, as reported in his article in the present number of the GAZETTE on the treatment of whooping-cough with antipyrin.

THE ACCOMPANYING EFFECTS OF ANTIPYRIN.

THE *Deutsche Medicinal Zeitung* for November 24, 1887, is almost entirely made up of articles relating to antipyrin. American, Austrian, German, French, Hungarian, and Italian practitioners and experimenters are quoted at length. Naturally their opinions differ on various points, yet all agree that in antipyrin we have an antipyretic of great value, and one which is singularly free from unpleasant accompanying symptoms. Among the few authorities who have observed unpleasant symptoms to follow its use Dr. Daniel Bernouilli, of Basel, is conspicuous. His experiences with the drug are far from favorable. The case he cites is a most singular one. The patient was suffering from a subacute attack of rheumarthritis, and antipyrin was prescribed. It was, however, observed that a quick rise of temperature immediately followed after every dose of the drug. At first the remedy was well endured, but later, small and single doses called forth this singular and paradoxical action. Immediately after the administration of the drug pain was produced in the chest and bowels, followed by a quick and considerable rise of temperature, accompanied by chills, a full, rapid pulse, vomiting, turgescence of the face, injection of the conjunctivæ, and also by an eruption which at one moment would be very apparent, and in a little while after scarcely noticeable. This action was certainly due to an "idiosyncrasy" of the patient towards antipyrin.

Reports on Therapeutic Progress.

THE NATURE AND DANGERS OF INTRA-UTERINE MEDICATION.

The discussion on the above subject at the meeting of the New York Academy of Medicine on December 22, 1887, was opened by a paper read by DR. PUTNAM-JACOBI (*Med. Rec.*, January 7, 1888), in which reference was made first to a paper read in January, 1885, when the opinions of forty-five eminent gynæcologists were given, with forty in favor of and five opposed to the method. The most recent statistics on this point showed that the ratio for and against had changed somewhat.

The objections which had been urged against intra-uterine medication were that it was dangerous, inefficacious, or superfluous, or all three together. After referring to these briefly, the author of the paper proceeded to inquire more precisely concerning the series of clinical phenomena which followed the employment of caustics, as the paper did not consider any intra-uterine medication which was not caustic. The cen-

tral purpose of the method was surgical and for the removal of diseased tissue.

After a caustic was applied, the first effect was contraction of the muscular fibre of the uterus, attended by pallor of the tissues. The second effect was bleeding from the mucosa, and that might be considerable. Third, during several hours after the application there was a painful sensation, varying in intensity. Fourth, cramps might not occur after the application, but a diffused pelvic pain coming on at the end of fifteen minutes or an hour, and lasting a variable length of time. This implied dilatation of blood-vessels and hyperæmia, with active afflux of blood to the parts. Fifth, from thirty-six to forty-eight hours after an application bleeding from the uterus occurred, accompanied by discharge of shreds of tissue, which was the eschar formed by the caustic. Sixth, after the cessation of the secondary hemorrhage, the leucorrhœal discharge existing previous to treatment frequently diminished, and coincidently the pelvic pain and the first menstruation were less painful in favorable cases. Sometimes an unusual painful menstruation followed first, which was regarded as unfavorable.

The next inquiry was, How did the treatment modify the metritis? The essential of all uterine therapeutics was to increase the arterial circulation in the pelvic tissues for the purpose of dissipating venous hyperæmia. The difference between the active hyperæmia determined by cauterization and that resulting from disease was then pointed out, and the effect of the intra-uterine medication upon the next menstruation described.

The theory of the action of any application to the endometrium was then discussed, and its effect upon the physiological process sustained in the uterus, which made intra-uterine so surprisingly different from every other form of cauterization. The endometrium was not to be compared with mucous membrane, because it possessed the peculiarity of reproduction. It was that peculiarity which made it impossible to treat this as other chronic inflammations were treated.

The object desired was to modify the menstrual process, which was nearly continuous, and to do that the short interval must be seized, with the expectation that the effect of the application would extend through the time of the following menstrual period. Attention was then directed to the dangers of the method. The present paper was based upon fifty cases, in which cure was produced in thirty-nine without accident. In five cases accidents occurred. In two cases cure was effected in spite of the accidents. One death occurred. The details of the five cases were given.

Of all the dangers of the method none was so important as approximation to the menstrual period. The period of danger began ten days after the close of menstruation, although in many cases the application might be made without danger much later in the month. Never make two applications in one month until the tolerance of one had been established, and the second application, as a rule, was to be milder than the first. It was very exceptional that three applications could be made in one month. At the end of three months it was advisable to suspend the treatment for two or three months. In the great majority of cases it was unsafe to make the application in the office and allow the patient to go; for she should remain in bed from six hours to six days. Intra-uterine medication should be regarded as a surgical operation.

The agents which the author of the paper had employed were iodized phenol, carbolic acid, and nitric acid. The treatment was indicated in fundal endometritis; endometrial catarrh always associated with parenchymatous metritis complicated by displacement, and always attended by cervical catarrh; metritis quite often with little or no catarrh, and in the text-books regarded as incapable of treatment in this manner. Peri-uterine inflammation might be said to forbid intra-uterine medication; but if it was secondary to endometritis, the method might be indicated. Finally, intra-uterine medication was to be regarded as only one part of a complex treatment for uterine disease.

Dr. W. Gill Wylie fully agreed with much that had been said in the interesting and instructive paper, but there were some points on which he was not in full accord with the writer. He was pleased to hear her speak of the application as a surgical procedure, because it was one, and he thought that that fact accounted for the lack of success it should have.

His practice had been one in which he had used intra-uterine medication a great deal, and he invariably kept a case under observation a long time before making an application. Almost without exception, the cases should have preparatory treatment. He agreed with the author of the paper entirely in the statement that one thing to be accomplished was to improve the circulation of the pelvic tissues, certainly the uterine tissue. He was

satisfied that preparatory treatment, by means of boro-glyceride, or the alum and glycerin mixture, should be kept up for at least one month before making an intra-uterine application. He never made an application without testing whether the uterus was dilated or contracted. If contracted in the least, he used dilators that enabled him to make a thorough and complete application, and also to secure perfect drainage, which was as important as the application itself. The old mucous plug was so readily displaced by slight dilatation that it did not cause the least trouble.

Another objection to the paper was the recommendation of the use of strong acids. He believed that the cases were exceedingly rare in which anything stronger than carbolic acid was required. In very old cases a mixture of carbolic acid and iodine might be used. He preferred to divulse and use the milder agents, and, so far as his own practice was concerned, two winters would pass probably without a single accident after intra-uterine medication.

By the preparatory treatment, he was able to adopt the method in his office or at the clinic. He might dilate slightly at the time of the application, but he never dilated unless he was thoroughly acquainted with the patient and the case. Intra-uterine medication should never be adopted in acute cases. Keep such cases under observation until they become subacute.

It was also very essential to make the application through a cervical tube, as without that precaution not more than one-third or one-half of it ever reached the uterine cavity.

Dr. S. Baruch said it had been justly stated that intra-uterine applications were surgical procedures, and therefore he believed that the same course should be pursued as in similar conditions elsewhere, as in the treatment of bone, for example.

Three years ago he read a paper on the "Therapeutical Significance of the Cervical Follicles" (*New York Medical Journal*, 1885), in which he endeavored to show that all those diseases of the uterus classed under metritis, with or without catarrh, were most successfully treated by treating these follicles. His method was, when the disease was in the cervix, to open with a narrow bistoury, and with a sharp curette to destroy as much of the glandular structure as possible. He also treated intra-uterine catarrh with the sharp spoon. At the time he published his paper he was in doubt somewhat as to what would be the ultimate effect of removal of the mucosa, but he had since had ample evidence that the entire removal of the mucosa did not prevent its reproduction. Düvelius, Martin's assistant, had demonstrated that it was impossible to remove the glandular structure entirely, so that it would not be reproduced, and had reported sixty cases in which the woman became pregnant subsequent to thorough removal of the mucosa. It seemed to him, therefore, that thorough curetting was much more in accordance with modern surgical ideas than the repeated use of caustics. It was the practice which he had pursued during the last three years with satisfaction.

Dr. P. F. Mundé took occasion not long ago to publish his views on this subject, and he did so because he thought the tendency was to drop intra-uterine medication entirely. He believed that it had a position which it would always retain. It was a surgical procedure, and dangerous, as might be the introduction of a sound, or even a digital examination. Therefore it must be undertaken with proper precautions. The applications should be made at the house of the patient, although probably, in the great majority of cases, it was impossible to observe that precaution.

There were three main indications for intra-uterine medication,—first, intra-uterine catarrh, extending from the cervix to the fundus; second, subinvolution or hyperplasia, with or without catarrh, where it was desirable to reduce the size of the uterus; and, third, to control hemorrhage.

For many years he had used the milder agents, mentioned by Dr. Wylie, but his results had not been as satisfactory as he would like to have, and he had sometimes felt that the applications were almost useless. At the same time, with proper precautions, he had been fortunate enough to escape entirely any bad consequences, except in two cases, where cellulitis followed,—in one due to imprudence probably, and in the other the cause was not apparent. Finding that mild remedies did not answer, he had placed his patients in bed, dilated the canal, if necessary,—not much dilatation being required in chronic uterine catarrh,—so that the largest uterine applicator with a pledget of cotton could be readily introduced, curetted with a dull instrument, and then swabbed the entire endometrium with a saturated solution of chloride of zinc, repeated two or three times perhaps, or until no bloody fluid oozed out of the

uterine cavity. Then pack the vagina with iodoform or vaseline cotton. Keep the patient in bed two or three days, and apply an ice-bag to the abdomen for the first twenty-four hours. The next application was made at the office, but not within two weeks, and then a solution of one drachm to the ounce was used, or nitrate of silver of the same strength. The subsequent applications were made once a week. During the last two years he had succeeded much better than he did formerly, when he made half a dozen or a dozen stimulating applications. Of course, some patients would not submit to the procedure, and then the milder measures had been used.

For some time he had not used the cotton-wrapped syringe, because he had come to regard it as not perfectly safe.

For hæmostatic purposes he curettes, and then plugs the uterine cavity with cotton saturated with subsulphate of iron and glycerin, equal parts, and he had never seen any bad results from the treatment. Attach a string, and direct the patient to remove the plug at the end of twenty-four hours.

We should be able to practise intra-uterine medication with complete safety in the office, but had not reached that point yet. Iodoform and alum pencils, five grains each, covered with gelatin, did good in mild cases, and seldom produced discomfort. They served very well for the treatment after the use of the severe caustic. Possibly galvanism would prove to be the remedy that could be used with greatest safety.

Dr. Cushier had employed intra-uterine medication during the last ten years, with good results in young, unmarried women, when the chief symptom had been dysmenorrhœa, or pelvic pain with the menstrual period; also in chronic metritis, subinvolution, and where there were reflex symptoms from pelvic disorder not due to either uterine displacement or ovarian disease.

Her largest experience had been in the cases in which the prominent symptom had been severe dysmenorrhœa, and then it had not been employed until other means had failed; yet there had been but few cases in which the result had been unfavorable, and in many complete cure had been effected. Pelvic inflammation had not occurred in any case since the applications had been made with the precautions advocated in the paper; that is, never after ten days subsequent to menstruation, and never within ten days of the next period. Thus far she had not seen any necessity for using stronger agents than carbolic acid and iodized phenol; perhaps had been fortunate enough not to have seen the intractable cases mentioned this evening. The applications were never made except at the house of the patient, and it depended entirely upon the amount of reaction whether she should remain in bed one, two, or three days.

Nor did she believe that the results were so good as they might be if the patient was permitted to get up sooner than two or three days after the application. The benefit in some of the reflex cases had been very marked indeed. In women who had not borne children, she never resorted to intra-uterine applications until other means had failed, because she had found that the reaction was much more marked, and also that other remedies were much more effective than in women who had borne children.

Dr. Malcolm McLean had narrowed the agents he had employed down to strong carbolic acid. If applied thoroughly it would do what the stronger caustics had had claimed for them, without the risk attached to their use.

He used a ninety per cent. solution of carbolic acid, introducing just enough into the uterus to touch the diseased surface. It was very important to have a well-dilated cervical canal, and then, if a tube was used, a thorough application could be made. The time for making the applications—that is, within the ten or twelve days succeeding menstruation—he regarded as important. As to the necessity of the patient being at home, he had not insisted upon it, although it would be a safe precaution to take. He had not had cause to regret making the application in the office, although he had insisted that the patient go home at once and go to bed for a short time. He believed that in carbolic acid we had such a valuable remedy for these cases, so much safer than any other, that we should confine ourselves to its use as much as possible.

Dr. H. J. Boldt had been in the habit of making intra-uterine applications up to within a few days of the menstrual period, and had not had any accidents. He endorsed the statement that the application should be regarded as a surgical procedure, and that it was dangerous if proper precautions were not observed. The preparatory treatment he regarded as one of the most important points, and when the susceptibility of the endometrium to irritation was well known, intra-uterine medication could be adopted safely in

office practice. The cervical canal must be dilated so as to give free drainage. In old cases he used the curette. He had used the cotton-wrapped syringe without accident. He had not employed strong caustics, but had not hesitated to make two applications a week, beginning a few days after menstruation, and continuing up to within a few days of the next period. He had used galvanism only in private practice, but had found that certainly not above fifteen milliampères could be employed.

Dr. A. F. Currier thought it important to keep in mind the fact that there was a great difference in the tolerance of patients with regard to intra-uterine medication, and, therefore, no fixed rule could be laid down applicable to all cases. It was probable that where it was used without regard to precautions it not only did no good, but did harm. Without the precaution of having the canal open, it could not reach the endometrium. He had seldom seen dysmenorrhœa benefited by the applications. In cases of hemorrhage what was done must be done at once, and in subinvolution and other chronic conditions he had found but little need of long preparatory treatment. He used carbolic acid with iodine to the exclusion of almost everything else, except a strong solution of nitrate of silver. He had used electricity in cases of endometritis and sterility, with satisfactory results, and conception had followed in two cases.

Dr. Putnam-Jacobi, in closing the discussion, said that the question of preparatory treatment should not have been omitted in the paper, as she never adopted intra-uterine medication without two or three months' acquaintance with the patient. The question of drainage, also, was important, and the applications should never be made in cases of displacement. The substitution of curetting, as suggested by Dr. Baruch, for all other methods of treatment, she thought was inapplicable, because there were two conditions which must be taken into consideration,—first, the thickness of the diseased endometrium; and, second, the degree of existing peri-uterine trouble. It was not intended in the paper to discuss other methods of medication or particular agents to be employed, but the effort was to attempt to investigate the theory of the action of any application made to the endometrium, and also to correlate observed facts with physiological processes sustained in the uterus. The physiological process seemed to have been overlooked entirely in the discussion. The impossibility of treating this as other inflammations were treated was one of the points which she insisted upon; that the beneficial results of intermittent treatment could not be explained without the series of phenomena developed outside of the uterus; and that the question of danger depended upon the phenomena in that invisible locality.

A remark made by Dr. Cushier should be emphasized, and that was with regard to rest after the application. If the patient walked about, there was a possibility of the development of intense hyperæmia which would prevent arterial tension, the most important condition to be obtained.

THE PHYSIOLOGICAL AND THERAPEUTICAL ACTION OF HYPNONE.

The medium dose in adults is from 30 to 40 centigrammes; when given in quantities greater than 50 or 60 centigrammes it causes pain and heat in the stomach. Dr. Pensato (*London Med. Rec.*, December 15, 1887) administers it in Limousin's capsules, 10 centigrammes in each. He finds that as a hypnotic it is not inferior to chloral, and it does not depress the heart's action. In phthisis it answers well in doses of 3 capsules at bedtime; the patient has a quiet night with some hours' sleep; the cough is lessened, and the patient wakes refreshed, without pain or headache. In previous experiments Dr. Pensato found that hypnone had a decided antifermentative and antiseptic action; for instance, it delayed the ammoniacal decomposition of the urine and prevented the alcoholic fermentation of sugar and yeast; it delayed, too, considerably the putrefaction both of organic animal and vegetable substances. Thinking that this antiseptic action might be useful in phthisis, and having found that when given as a hypnotic the cough and expectoration were notably diminished, he has lately given it as an inhalation, 5 drops every four hours in a mask inhaler (Curschmann's). The effect is undoubtedly good; the cough is lessened, and the expectoration altered both in quantity and quality; in one case the purulent sputum became mucous. In some cases, but not in all, the temperature was lowered. Dr. Pensato thinks that these results are sufficiently encouraging to warrant a further trial of these inhalations.

THE ACTION OF CORROSIVE SUBLIMATE ON THE INTESTINE.

According to the Berlin correspondent of the *Medical Press* of December 21, 1887, at the session of the Berlin Medical Society of November 22, PROFESSOR VIRCHOW showed three preparations illustrative of the action of corrosive sublimate on the intestine. The first case was that of a puerpera, æt. 25, who had been already treated outside the hospital with carbolic acid. She was admitted into the Charité at the beginning of November, and had in all three uterine injections of a litre of water, with one gramme of corrosive sublimate in each. Besides this iodoform was made use of. The patient died on November 6, and at the autopsy, in addition to the evident diphtheritic condition of the vagina, parametritis and perimetritis purulenta, empyema and arthritis multiplex purulenta were met with, and besides these a serious diphtheria of the colon. He had the intestine submitted to chemical examination, and discovered mercury in the spots affected. A second case was likewise one of puerperal fever, in which death took place on November 15. That patient had been treated with sublimate in the city before admission into hospital. The autopsy showed the uterus in a fairly good condition, but there was diffuse disease of the endocardium, the kidneys, and the liver. The principal affection was exceedingly grave disease of the colon. In a third case, in which the autopsy took place on November 17, the patient was a railway employé, who had suffered from constitutional syphilis.

As regarded the anatomy, the localization of the affection exactly coincided with that recognized by the name of diphtheritic dysentery. There were the same eminences and folds that correspond to the inner lining of the colon, and upon which an affection developed, which began with reddening and increased with rapid swelling. Then there came on œdema of the submucosa, a hemorrhagic condition quickly followed, and in these developed a diphtheritic infiltration, that quickly advanced to such a height that they formed hills and mountains on those spots. The condition was the result of sublimate, and could only arise through the circulation. Liebreich, who had performed in 1879 a series of experiments on animals with sublimate, had made the same observation. In fact, on these hemorrhagic and hyperæmic spots bacteria settled, as sublimate irritated the tissues, and favored the settlement of colonies of bacteria. Such cases showed that caution in the use of sublimate was requisite.

HERR SENATOR had seen two similar cases in a woman and a girl respectively. In his cases, although the colon was seriously affected, the stomach and small intestine were uninjured, which showed that the action of the poison was not local, but that it was excreted by the intestinal glands, and then began its action.

HERR SAENGER had performed autopsies on some cases of the sublimate-poisoning in the Breslau Pathological Institute.

HERR LIEBREICH remarked that experiments on animals had proved that sublimate was excreted through the bowel. The specimens showed by him were from the most varied preparations of mercury. He had discovered in his experiments that, injected subcutaneously, all the preparations of mercury acted like the sublimate. It was decomposed within the body, and was then excreted through the intestine. His first case was from Schroeder's clinic. The stomach was intact, although large quantities of mercury had been swallowed. The conclusion must be made that sublimate was absorbed in the first part of the intestinal canal, and excreted later on in the form of albuminate of mercury. This was usually insoluble, but in the presence of slightly alkaline fluids solution takes place, and the solution has a very slight disinfecting power.

TREATMENT OF PSORIASIS BY IODIDE OF POTASSIUM.

The Norwegian physicians, Dr. Greve and Dr. C. Boeck, have recommended large doses of iodide of potassium for the cure of psoriasis. DR. HASLUND has given this treatment an exhaustive trial in the Commune Hospital in Copenhagen, and in an article in the *Viertelj. f. Derm. u. Syphilis*, 1887, 3 Heft, confirms the statements of these physicians. A very remarkable fact established by Dr. Haslund's experiments is that iodide of potassium can be tolerated in much larger doses than had been previously imagined. He gave the drug in many cases in doses that must be considered enormous. In the case of one man he went so far as to give fifty grammes (750 grs.) in a day, and in a number of cases he gave thirty and even forty grammes a day.

It would appear from a tabulated statement in the paper that in forty cases a complete cure of the psoriasis was attained, while in

four others there was considerable improvement. In six cases no benefit followed. No reason could be detected for failure in these six cases. Of the forty cases which were cured, twenty-four were men, three women, and thirteen children under 15. Most of the cases were chronic, but five of them were acute and recent. The duration of treatment varied from seventeen days to eleven weeks. In the cases of the men the average time was five weeks; in the cases of the three women six, ten, and eleven weeks respectively. In the cases of the children the time was from five weeks to fifteen, the average being nine to ten weeks. Taking no account of six cases in which the average of treatment was only seventeen to twenty-five days, the average of all the other cured cases was slightly over seven weeks. In all the six cases in which a cure was so quickly attained, the eruption was chronic and almost universal.

The disease began to subside in some patients when the daily dose had reached from seven to eight grammes, in some ten grammes, but in most of them in larger doses; in others, only when twenty or thirty grammes daily were given, and in one patient a cure did not begin to show itself until the daily dose was thirty-five grammes. The total quantity required for a cure varied in men from one hundred and sixty to thirteen hundred and ninety grammes; in women, from five hundred and twenty-six to thirteen hundred and twenty-eight grammes; and in the children, from two hundred and seventy-seven to fifteen hundred and twenty grammes. In most of the cases, after the disease once began to disappear, only a short time elapsed until the skin became quite smooth.

Dr. Haslund begins treatment with comparatively moderate doses, but rapidly increases them. It is remarkable that in all the cases slight signs of iodism were observed only in ten, but in none of these was it necessary to suspend the cure, although the doses were in consequence increased more slowly. With the larger doses there was, in seven cases, disturbance of the digestion, which ceased on the dose being diminished to one-half for a few days, it being very seldom necessary to suspend the iodide altogether. In two cases patients suffered from headache and giddiness; in one patient the pulse was for one day irregular; in two cases there was slight albuminuria, which continued eight days in one, and in the other only for a single day, but it was not found necessary to suspend the iodide.

In one case the symptoms of iodism were severe, indications of paralysis of the heart having become threatening without being actually dangerous. In most of the cases there was not a trace of iodism observed, in spite of the extraordinary doses which were given. Extraordinary, indeed, the dose must be considered when a girl of 14 years of age took forty grammes a day, and a girl of 9 years of age had thirty-five grammes. In two cases it was impossible to continue the iodide on account of idiosyncrasy. A woman, 30 years of age, after one dose presented an appearance resembling that of erysipelas of the whole face, and in her case toleration could not be established. One man, even with very small doses, was so violently affected with headache, sickness, salivation, lachrymation, angina, sinking, and diarrhœa, that the treatment had to be given up.

In three cases the blood was examined during the treatment, and it was found that the number, size, and form of the blood-corpuscles were not altered.

Dr. Haslund considers himself justified, after these experiments, in considering that we possess in iodide of potassium, given in large doses, a remedy which can with considerable certainty be relied on to cure an attack of psoriasis; and, further, that at the present time we know of no remedy which, taken inwardly, can cure it in so short a time. He does not believe that it will prevent relapses, but recommends that iodide should be given for some time after a cure has been obtained.

The most striking apparent effect of the large doses was the quickening of the pulse, which, after ten to fourteen days of treatment, usually reached 100, and then went slowly up to 130 per minute.

The urine was systematically examined in the cases of four persons in order to determine whether the iodide of potassium increased or diminished the quantity of urea. From these examinations it appears that iodide of potassium, even when given in very large doses, has no effect on the excretion of urea. The amount of urine quickly increased or diminished in proportion as the dose was raised or lessened.

The alleged power of iodide of potassium to diminish fat and lead to shrinking of the glandular tissues was not confirmed. In those persons who suffered, not only from psoriasis, but from chronic swellings of the glands, the glandular swellings remained at the end of the cure unchanged. With reference to the supposed atrophic effect which

the drug is thought to have on the testes, ovaries, and mammæ, Dr. Haslund states that in the female patients to whom large doses were given, no diminution in the size of the mammæ was observed; on the contrary, in those of them who increased in weight during the cure the mammæ became larger. In regard to the ovaries, no examination was made, but he assured himself that in the male patients the testes underwent no change.

Cases of catarrh of the respiratory organs and of the conjunctivæ were few, and in these so slight that no regard was paid to them; when they were present it was usually at the beginning of the cure. Bronchitis was never produced. The perspiration was either not increased, or so little that the increase was not observed. In only a few patients was their saliva increased, and that only temporarily. In one, however, there was decided salivation.

Those members of the profession whose studies and duties lead them to be specially interested in the action of drugs, will do well to give careful attention to Dr. Haslund's paper. Perhaps it is not out of place to remind those who might be led to repeat Dr. Haslund's experiments that his patients were under close observation in hospital during the whole period of treatment, and that it is only where constant watchfulness and care can be secured that it can be desirable in the mean while to imitate Dr. Haslund's treatment by these heroic doses.—*British Med. Journ.*, January 7, 1887.

AN INTESTINAL ANTISEPTIC.

Careful bacteriological studies have shown that none of the drugs ordinarily used internally as antiseptics have much, if any, potency, so far as the fermentative changes in the intestine are concerned. Calomel, bismuth, salicylic acid, naphthalin, carbolic acid, all diminish the number of micro-organisms in the fæces but slightly, perhaps one-fourth or one-third at the most. Given in large enough doses to be really effective germicides, they are all dangerous to life.

To secure a real intestinal antiseptic we must find a drug but very slightly soluble, not readily decomposable, non-irritating, of powerful disinfectant property, and comparatively innocuous to life, even when it does reach the circulating fluids of the body. Rossbach thought that in naphthalin such a substance had been found, but in this later experience shows that he was mistaken.

In a recent communication to the Académie des Sciences, M. Bouchard (*Med. Record*, December 24, 1887) claims to have found a substance which does fill all these requirements,—viz., naphthol. Naphthol is not a new drug. It has been used by dermatologists for six or seven years, and by surgeons for a somewhat shorter time. The preparation usually employed is the beta-naphthol, and this is what Bouchard uses. It is obtained from tar, and is a substance soluble in alcohol, but not in pure water.

Bouchard first made a series of experiments to determine its germicidal power. With regard to pyogenic micro-organisms, he found that a solution of .40 per 1000, or .04 per cent., was sufficient to prevent their development. This, he states, is one-sixteenth the strength of mercuric biniodide, and five times the strength of carbolic acid.

But though less powerful than mercury as an antiseptic, it has the advantage of being comparatively harmless to the human body. As the result of tests made, Bouchard states that the toxic dose of naphthol for a man weighing one hundred and thirty pounds is two hundred and fifty grammes, or about half a pound. On the other hand, a daily dosage of 2.50 grammes, or less than forty grains, is sufficient to produce intestinal antisepsis. Toxic, not lethal, effects have only been produced when the naphthol was ingested in doses of about twenty-six grammes. The phenomena are those of albuminuria, spasmodic muscular contractions, salivation, and coma. Hæmaglobinuria has not been observed.

Bouchard gives the following interesting tabular statement of the comparative antiseptic power, toxicity, and dosage of several different substances:

	Antiseptic dose. Per 1000.	Toxic dose. Grammes.	Daily toxic dose. Grammes.
Iodoform	1.27	0.50	0.05
Iodol	2.75	2.17	1.24
Naphthalin	1.51	3.40	1.00
Beta-naphthol	0.40	3.80	1.10

ALPHA-OXYNAPHTHOIC ACID, $C_{11}H_8O_3$.

Under this name a new antiseptic has been introduced in Germany, which is stated to be likely to come into use very largely as a disinfectant. It is a derivative of a naphthol, just as salicylic acid is a derivative of phenol. It is prepared in the form of a sodium salt from *a*-sodium naphthol, by acting on it with

carbonic acid, and precipitating the alpha-oxynaphthoic acid by the addition of any mineral acid. As at present met with in commerce it is a nearly white crystalline powder, nearly free from odor, but very irritating to the nostrils, and has a pungent taste. It becomes electrical when rubbed, and melts at 186° C., decomposing at the same time. It is soluble in pure cold water only to the extent of 1 in 30,000, and if acids are present, only to the extent of 1 in 80,000. In alkaline solutions it is readily soluble. The salts of the alkaline earths with *a*-oxynaphthoic acid are also soluble in water. Although boiling water dissolves more of the *a*-oxynaphthoic acid than cold water, the greater part crystallizes out on cooling. On boiling for any length of time, it is decomposed into a naphthol and carbonic acid gas. It is soluble in alcohol to the extent of about 0.1 gramme in 1 cubic centimetre of the solvent, to a greater extent in hot alcohol, and in benzine and chloroform in even less quantity than in alcohol. It is soluble also in essential and fixed oils and in warm glycerin. An aqueous solution is colored by a solution of ferric chloride. Comparative experiments made with salicylic acid and *a*-oxynaphthoic acid, with the view of testing its antiseptic properties, show that the latter is more than five times stronger than salicylic acid. It has been shown also to be very fatal to certain bacteria and animal parasites. On this account it has been proposed to use it for disinfecting waste liquors and stagnant waters giving off unhealthy emanations. Although when used in this way for disinfecting water previously known to be distinctly injurious, no noxious effects upon fish have been observed. In therapeutic applications of this new drug certain toxic effects have been noticed, and until the extent of these have been determined its application as a disinfectant and antiseptic must be limited. From the low price at which it can be manufactured, and its valuable properties, there is but little doubt that it will receive an extensive trial.—*Provincial Med. Journal*, December 1, 1887.

SALOL IN AFFECTIONS OF THE THROAT, EAR, AND EYE.

Dr. Thorner, of Cincinnati, used salol in rheumatic and neuralgic affections of the throat, ear, and eye with good results. He treated cases of rheumatic angina, follicular and parenchymatous tonsillitis, and rheumatic wry-neck with doses of 10 to 15 grains three to four times a day. The pain was in all cases greatly relieved, and the restlessness towards night disappeared after doses of 10 to 20 grains within thirty minutes. In cases of simple nervous otalgia a few 10-grain doses were sufficient to effect a cure, whilst in a case of chronic purulent otitis of the middle ear with persisting shooting pains in and behind the ear, the patient was relieved after using the drug for two days. In one case of severe neuralgia of the entire head, especially located in both ears, salol afforded no relief, although continued for over a week. Good results were also obtained in cases of simple ciliary neuralgia of long standing, rheumatic iritis, acute catarrhal conjunctivitis, with severe supraorbital pain, and in acute trachoma, with ulcerative pannus, where the pain over and around the eyes was exceedingly intense. In most cases the relief was immediate, in a few after using the remedy for several days. Salol seemed to be especially valuable in those cases where good results had been obtained by the salicylate of sodium, but where the latter salt was not tolerated. Bad effects were not observed, except in a few cases slight ringing in the ears.—*Cincinnati Lancet-Clinic*, December 10, 1887.

GUAIACOL AS A SUBSTITUTE FOR CREASOTE IN PHTHISIS.

Dr. H. Sahli, of Berne, writing on the treatment of phthisis by creasote, remarks that creasote, by which is meant that prepared from the tar obtained by the destructive distillation of beech-wood, is a complex substance, the constituents of which vary considerably in different samples, and that it is surely desirable to use for therapeutical purposes some simple substance of known composition. He finds that in the beech creasote, as prescribed in the Swiss Pharmacopœia, the largest constituent is guaiacol, the methyl-ether of pyro-catechin, $OH.C_6H_4.OCH_3$, which constitutes from sixty to ninety per cent. of the whole, the rest being chiefly made up of creasol, the mono-methyl-ether of homo-pyro-catechin, $OH.C_6H_3[CH_3].OCH_3$. Guaiacol being the chief constituent of creasote, Dr. Sahli prescribed it in cases of phthisis, and found that it had an excellent effect in moderating the cough, making expectoration easier, frequently diminishing the secretion, and improving the patient's appetite and general condition. Some who were confined to bed and suffering from a considerable degree of pyrexia were unable to retain the medicine, and vomited it. In some

cases, too, it brought on diarrhœa. On the whole, however, Dr. Sahli was well satisfied with the guaiacol as a substitute for creasote. It is a colorless, highly-refracting liquid, soluble in alcohol, ether, and fat oils, but only slightly so in water. The alcoholic solution gives with perchloride of iron an emerald-green coloration. The taste and odor of guaiacol are more agreeable than those of creasote. As solutions of guaiacol deposit resinous substances when exposed to light, they should be kept in colored-glass bottles. One or two parts of guaiacol may be dissolved in one hundred and eighty parts of water and twenty of spirit. 1 or 2 teaspoonfuls of this may be ordered in a glass of water two or three times a day after meals, or the guaiacol may be dissolved in cod-liver oil, which almost completely disguises its smell. In this way larger doses can be taken than when the solution in water is prescribed. The price of guaiacol does not seem to be very much higher than that of creasote.—*Lancet*, December 24, 1887.

TREATMENT OF CHOREA BY CEREBRAL REST.

In a thoughtful paper read by Dr. J. Leonard Corning before the Medical Society of the County of New York, December 26, 1887 (*Med. Rec.*, January 7, 1888), the claim is made that for a successful treatment of chorea the first indication which must be made is to allay the condition of cerebral erethism which is the constant accompaniment of this disease.

If the child is at school, she should at once be removed; and even the milder kinds of intellectual work should be strictly prohibited. But these measures, though good enough in themselves, are rarely sufficient to overcome the evil already accomplished. To arrive at satisfactory results, we must afford complete rest to the exhausted and irritated ganglia. In other words, we must induce sleep, and by prolonging the state of unconsciousness to suit the morbid exigencies, enable those reparative processes to transpire in the ganglia which are essential to the complete functional restoration of the cell. The great factor in the successful treatment of this class of cases, then, is rest,—perfect, undisturbed tranquillity of the thinking apparatus,—not the limited amount of rest suited to the healthy brain, but a quantity greater in proportion to the degree of morbid deterioration. By prolonged sleep it is possible for the ganglia to hoard up an amount of energy proportionate to the duration and profundity of the sleep itself, or, in other words, in the ratio of the reduction of the daily output of brain-energy. Thus by slow degrees the proper correlation between integration and disintegration may be re-established. It is useless, however, to hope for any permanent results at once, for, when the perverted nutritive conditions have once become established, nothing short of prolonged rest can by any possibility result in the re-establishment of the normal nutritive processes of the cell-economy.

Where the function of sleep is affected, as it is in many cases, it is impossible to increase at once the amount of rest to a sufficient extent to meet the demands of the morbid cerebral condition. Nevertheless, by gradually increasing the duration of the sleeping period, it eventually becomes possible to afford the patient an amount of rest sufficient to neutralize by slow degrees the condition of irritation and exhaustion. The bromides should be given during the day in cumulative doses, in order to allay the condition of irritability, and to cause a progressive decline in the mental manifestations as the hour for complete repose approaches. There should be no hesitation in employing sedatives, but always with the understanding that their use is only a measure of temporary expediency.

The most difficult class of cases to manage is that in which there is present some stomachic weakness precluding the possibility of any considerable medication, and necessitating a more or less protracted discontinuance of treatment from time to time.

Where such digestive difficulties exist, no attempts at profuse medication should be made, at least not until the tolerance of the stomach has been largely increased by appropriate means. With the present resources at our command, this problem is much easier of solution than it would have been even ten years ago.

The method by which the above principles of treatment may be carried out are: 1, cerebral rest; 2, increased general and cerebral nutrition; 3, elimination of psychical irritation, and removal of peripheral irritation, particularly that engendered by light and sound.

The subject is secluded in a darkened room from ten to fifteen hours at a time, according to the amount of sleep which it is desired shall be had during the twenty-four hours. The amount of sleep is *progressively* increased by habit, moderate medication, and hydrotherapy, and no attempt is made to pro-

duce a sudden state of stupor by the reckless use of sedatives. When the patient awakes, as is usually the case, two, or even three, times during the hours set apart for rest, nourishment is administered, but always in a fluid and easily-digested form. Where difficulty is experienced in again falling asleep, resort is had in the beginning to limited medication. The few hours of wakefulness are devoted exclusively to some form of amusement,—reading, writing, and even the mildest forms of mental concentration being absolutely prohibited. It is hardly necessary to say that the problem of cerebral rest is essentially different from and presents many more difficulties than spinal rest, as described in the earlier edition of Weir Mitchell's book. To give repose to the motor cells of the cord is comparatively an easy problem, and one which only exacts a permanent fixation of the motor apparatus for its solution, the consciousness or unconsciousness of the individual being only a matter of secondary importance. Rest, however, for those cells the function of which is the evolution of mind, can only be obtained by a prolonged period of absolute unconsciousness; and this, as a matter of course, will often tax the patience and resources of the physician to the utmost. Perseverance and the utilization of the principle of habit will usually, however, render essential assistance.

In conjunction with this system of rest, the Turkish and vapor baths may frequently be employed with advantage.

Having at length by these measures reduced the condition of cerebral erethism, alteratives may be given. At one time the sulphate of zinc was given very largely in chorea; but of late years the preparations of arsenic, which seem to exert almost a specific influence, have driven it more and more into the background.

In giving arsenic it is usually well to carry its administration up to the usual point of toleration. At the present moment Dr. Corning stated he had a boy of 15 under treatment, who is taking 8 drops of Fowler's solution three times a day, without apparent detriment. The case is one of three years' standing, and the patient, a precocious, neurotic, and undersized boy, has been in the hands of various physicians.

He at once put him upon a course of thorough rest, prescribed forty grains of the bromide of sodium a day, removed him from school, and prohibited animal food, substituting for the latter a farinaceous diet with milk. This farinaceous diet was, however, only continued *for a short time*, till the cerebral erethism had disappeared.

Six weeks have now elapsed since he first began treatment. The irregular movements, which were located in the left side of the face, extending to the shoulder and hand of the same side, have now ceased altogether, and only when excited or startled do they reappear. This case will, in all probability, make a complete recovery; but Dr. Corning will not allow him to return to school, or to indulge in violent exercise of any kind, for fear of a relapse. At present his appetite is good, and he is taking large quantities of nitrogenous food.

In this, as in many other cases, he employed simultaneously galvanization and refrigeration of the head in the beginning of treatment.

As this is a useful mode of allaying the irritability under which these patients labor, he described it. A stout band of india rubber webbing is first secured around the head, so as to interrupt the circulation in the scalp. An electrode of sponge, provided with a hollow chamber of tin, is then connected with the positive pole of a galvanic battery, and placed upon the head. The chamber is then filled with ice-water (not ice); and the negative pole having been placed on the neck, the current is made, and treatment continued for half an hour. Sometimes he still further enhances the efficacy of the procedure by the application of compression to the carotids (by means of any mechanical compressor).

Quite striking effects are sometimes observed immediately after the cold begins to make itself felt, which, of course, occurs rapidly on account of the suspension of the circulation in the scalp, by which the transmission of the cold to the cortex is greatly facilitated. Thus, some months since, he had a little girl under treatment for choreic spasms of the face. These, though not excessive, were obstinate in character, and did not yield readily to arsenic; and yet, when the above application had been made for about ten minutes, the spasms invariably entirely disappeared, and remained absent as long as the treatment was continued, and sometimes for an hour afterwards.

When the combined sedative action which the galvanic current and the ice exert upon the cortex is borne in mind, such prompt effects are, perhaps, not to be wondered at. To the child and his parents such results appear little short of marvellous, and the spirit of hopefulness thereby engendered consti-

tutes a helpful factor in a protracted course of treatment.

Finally, it is well, at least in the early part of treatment, to confine the patient to a strict farinaceous diet, which, in chorea, as in epilepsy, will form a helpful adjunct to the treatment.

These, in brief, are a few of the salient features of that mode of treating the affection which he has found most efficacious in practice.

TREATMENT OF HEPATIC COLIC.

Olive oil in large quantity is vaunted as a certain cure for hepatic colic due to gall-stones. Dr. Just Touatre, of New Orleans, has written an interesting account of self-cure of biliary colic and gall-stones, in the second number of a bimonthly Roumanian journal (*Archives Roumanies de Médecine et de Chirurgie*), whose editor is M. Georges Assaky. The method of procedure was as follows: At seven in the evening a blue pill of the weight of fifteen centigrammes was taken, and this was followed twelve hours later by the taking in one draught of twelve tablespoonfuls of olive oil; a quarter of an hour later a similar dose of olive oil was taken, and then the patient addressed himself to sleep on his right side. At nine o'clock the blue pill acted, producing a copious biliary evacuation, but no gall-stones. Three o'clock in the afternoon saw another bilious stool without stones, but from seven in the evening till midnight six stools were passed; the first two contained seventeen calculi of the size of a large pea, of conical shape, grayish-yellowish aspect, and soft consistence. Altogether sixty stones were evacuated, and six of these had the volume of an olive, and were of a black color. The passage of these calculi by the cystic and biliary canals was for the most part unattended with pain, a few spasms being felt probably at the time of the movement of the large calculi. An inexpressible relief was obtained from the pains over the liver and shoulder, which had previously caused much distress; the liver also diminished in size. For three months Dr. Touatre enjoyed perfect health, when the trouble commenced again; the olive oil was repeated in similar fashion, and with the result that eighteen more calculi were discharged by the bowel. Since then he has enjoyed excellent health. He admits that some courage is required to swallow the large doses of olive oil.—*Lancet*, December 10, 1887.

THE VALUE OF NITRO-GLYCERIN IN TINNITUS AURIUM.

Dr. L. J. Lautenbach has found that in cases of tinnitus aurium without much impairment of hearing, and where but little change had occurred in the naso-pharynx, and where some abnormal conditions of the heart exist, either functional or organic, the greatest service would be obtained from the use of nitro-glycerin (*Phila. Med. Times*, January 1, 1888). In many of these cases more or less structural changes from catarrhal inflammation of the middle ear were present among them, much in the shape and translucency of the drum-head, with accompanying change in the appearance or position of the triangular light spot. In some of his cases follicular pharyngitis was present, while in many a dull heavy headache more or less persistent was a frequent occurrence. In these cases nitro-glycerin was given in pill form in doses of $\frac{1}{100}$ of a grain, at first but 1 pill being given daily, generally in the morning. The amount was then increased sufficiently to diminish the tinnitus aurium or to cause headache, as many as six of these pills being sometimes given, although ordinarily two were found sufficient. In most of his cases improvement was manifest within a day or two, although in some the remedy was continued for two or three months before a satisfactory result was obtained. Dr. Lautenbach thinks that in nearly all cases of tinnitus aurium in which there is no cardiac lesion and a little or no loss of hearing nitro-glycerin promises to be of great value.

SURGERY OF HYDATID DISEASE OF THE LIVER.

At a meeting of the Clinical Society of London the discussion on the "Surgery of Hydatid Disease of the Liver" was opened by Dr. Coupland (*Lancet*, December 17, 1887), who read notes of a case of "Hydatid Cyst of the Left Lobe of the Liver" which was radically cured by operation. The patient, a tall and pallid youth, aged 17, was admitted into the Middlesex Hospital on January 22, 1887. For two years he had been getting weak and suffering from constipation, and for three months had noticed, in addition, a small and rather tender swelling in the upper part of the abdomen. Beyond his lassitude and somewhat hypochondriacal tendency, there was nothing special in his general condition. In the epigastrium there presented a hard nodule, the size of a nut, slightly tender, apparently

connected with the left lobe of the liver, with which it moved freely on inspiration. The cardiac pulsation was also transmitted to it, especially during expiration. The liver was not enlarged; there was no jaundice. The patient remained under observation for nearly two months, without any failing of his general health or any apparent change in the size or character of the small swelling. The diagnosis seemed to rest between a stationary innocuous growth or a shrivelled obsolete hydatid cyst, and exploration was decided on, with the view as much of relieving the patient's anxiety as of clearing up the diagnosis. Mr. Gould performed the operation on March 24, and a hydatid cyst of the size of an orange was found imbedded in the left lobe of the liver, projecting mainly on the posterior surface, but also to a slight extent on the anterior, where it formed the nodule previously observed. The cyst was punctured, and clear hydatid fluid containing numerous scolices evacuated. The cyst-wall was then firmly stitched to the peritoneum, the abdominal parietes freely incised, and a drainage-tube inserted. The case did well, and on April 3 the collapsed hydatid was extruded: it contained two or three small daughter-cysts free within it, besides having its endocysts thickly studded with scolices. Two days later the tough and fibrous adventitious cyst-wall was also extruded. The cavity rapidly granulated, and the patient left the hospital on the 28th for a convalescent-home. When seen a month later he was in excellent health. Thus the exploration in this case resulted in the radical cure of the disease, the cystic nature of which it was not possible to determine by ordinary methods. The very solid nature of the presenting nodule prevented any recourse to the aspirator prior to the operation, while the lad has been saved the risks of rupture and suppuration by resorting to the exploratory incision in preference to leaving the case alone as one of "abdominal tumor of uncertain nature." Hydatid cysts are far less common in the left than in the right lobe of the liver, and it is rare for one to be treated by free incision in so early a stage. Although doubtless simple puncture might have sufficed to have lulled the parasite, there can be no question of the advantage of total eradication, if, as such a case seems to show, it can be made with almost equal impunity.

Mr. Edmund Owen read a case of "Hydatid Tumor on the Upper Surface of the Liver successfully Tapped and Drained across the Pleural Space." A married woman, aged 34, who was born and had lived all her life in London, came under Dr. Broadbent's care in May, 1886, on account of pains in the region of the right hypochondrium and constant sickness. There was great fulness in the region of the liver, with dulness on percussion, which reached from the fourth rib nearly to the umbilicus. The right lung was greatly elevated and compressed. The hepatic tumor was smooth and hard, and gave no wave on impulse; it did not move with respiration, nor with any change of the patient's position. Aspiration removed thirty ounces of clear fluid, which contained no hooklets. In June another tapping was made, but with no result. In July, as the tumor was increasing, it was again tapped in the seventh space, sixty-eight ounces of bile-stained fluid coming away. This contained an abundance of hooklets. In the beginning of 1887 the patient was again admitted into the hospital. The tumor had increased, and there was danger of the cyst bursting into the thorax. Several aspirations were performed, with fairly satisfactory results. It was decided that the hydatid cyst, which was completely hidden behind the lower ribs on the right side, and was probably occupying the upper surface of the right lobe of the liver, must be incised and drained. On February 14 this was done by making an incision in the eighth intercostal space, opening the pleural cavity. Air rushed freely in; the finger, introduced, readily felt the diaphragm, which was bulging up along the inner surface of the chest-wall, but the lung itself, completely collapsed, could not be reached. The phrenic pleura was then incised, and with it the diaphragm. The finger, passed through the diaphragm, came at once upon the tense cyst, from which a considerable amount of fluid was withdrawn by aspiration, so that some of its surface might be dragged through the opening in the diaphragm and up to the skin wound. There it was fixed by four hare-lip pins, so that the wounded phrenic pleura might become glued to the wounded costal pleura, and that the cyst might be subsequently incised and drained without risk of leakage into the pleural space. The wound was dressed with wood-wool pads. On the fourth day (the patient's temperature never having reached 100°) the dressings were removed and the cyst was incised. Bile-stained fluid escaped, and with it pieces of cyst-wall like rotten wash-leather. A large flanged drainage-tube was inserted, and daily the cyst washed out with warm iodine-water, large pieces of cyst-wall escaping. The woman

made a complete and uninterrupted recovery. The pneumothorax gradually disappeared, as did also a slight effusion of fluid into the chest, and when Dr. Broadbent saw the patient a short time since she was well and fairly strong, whilst the lung had descended to its proper level. He alluded to a case in which Mr. Godlee a few months later had traversed a healthy pleural space to evacuate a lung-abscess. In the latter case sutures had been employed to stitch the margins of the wound in the phrenic pleura to those of the wound in the costal pleura, but Mr. Owen was of opinion that hare-lip pins were more handy than sutures, and quite as effective for the purpose, and he would prefer them to sutures if ever he had to fix the lung to the chest-wall before proceeding to deal with a suppurating pulmonary cavity. It would be an interesting question as to how long it would take for the wounded and approximated pleural surfaces to become securely fixed by adhesive inflammation; perhaps it would be an affair of hours rather than of days. The tolerance with which the pleura submitted to the intrusion, the rapidity with which absorption of air and inflammation effusion from the space occurred, and the perfect manner in which the lung resumed its function after long-continued compression and after operation, were important and cheering features in the case, and offered further proof, were that needed, that the healthy pleura was as amenable to surgical trespass as was the synovial membrane of the knee-joint or the peritoneum itself.

Mr. Treves read a case of "Extra-Peritoneal Rupture of a Hydatid Cyst of the Liver." The patient, a married woman, aged 21, was "hugged" by her husband, who seized her round the waist and lifted her three times from the ground. She was immediately seized with intense abdominal pain, became very faint, and was sick. For thirty-six hours she was unable to lie down, and would not allow her clothes to be removed. Twenty-four hours after the injury a swelling made its appearance under the ribs of the right side. This swelling in time extended to the left of the median line. It was dull on percussion, but did not fluctuate. It was not affected by posture, was evidently below the subcutaneous tissues, and was not intra-muscular. The case was diagnosed to be one of subperitoneal hemorrhage. No bruising was apparent, and no ribs were fractured. The patient had enjoyed good health, had never had a day's illness, had not suffered from jaundice, and had had no abdominal swelling. The tightness of her stays served to prove the last point. The swelling diminished at the end of a month. It now was more defined, was under the right ribs, and about the size of a child's head. It fluctuated, and could not be separated from the liver. The application of pressure, in the form of Martin's elastic bandage, caused a rise of temperature on each occasion of its employment. At the end of the second month the patient had become emaciated, and the swelling was very prominent. The tumor was incised close to the margin of the ribs. Hydatid fluid escaped, suppuration supervened, and the patient died, greatly emaciated, three months from the time of the injury. The necropsy showed that a hydatid cyst had formed in the posterior part of the right lobe of the linea close to the diaphragm. This had been ruptured by violence. The fluid had found its way into the subperitoneal tissues of the anterior abdominal wall. On the development of a second cyst—the one incised—the extravasated fluid had receded. The hepatic tissue of the right lobe was almost wholly destroyed. The case affords an example of extra-peritoneal rupture of a hydatid cyst of the liver.

Dr. Angel Money related a case of empyema due to hydatids that had been under his care at the Chest Hospital, Victoria Park. The patient spat up a translucent, jelly-like substance and laminated membrane with a great quantity of pus. Mr. Macready was called in, and excised a portion of the ninth rib; a large cavity was found in which abundance of hydatids existed, and were discharged at the operation to the amount of two large basinfuls. The hole in the diaphragm leading into the hydatid cyst in the right lobe of the liver was easily felt. A perfect recovery ensued.

Mr. Godlee drew attention to the difference in the doctrine of treatment in this country and in Australia. In the latter country surgeons found aspiration to be sufficient, whereas in England subsequent operation was often necessary. He described various methods of procedure which could be employed, and expressed an opinion in favor of drawing the sac out, aspirating, and then extirpating it.

Mr. Harrison Cripps had treated three cases. The first one by simple aspiration, which had to be repeated in a few months, when pus was found, but the patient did well. Trocar and drainage were employed for the second case, and with success. The third case was explored as an obscure abdominal tumor; the hydatid was found, and its sac

opened, a pint of pus escaping, after which the sac was removed entirely. Another cyst was discovered opening into the first; this was also opened up and removed, with a good result. In suppurating cysts it was best to open and remove the cyst-wall.

DR. DUFFIN had had two cases of hydatid in the left lobe of the liver. He did not believe in removing much fluid by the aspirator, but only enough to lessen the tension of the sac. In the first case, which happened in a girl, aspiration alone was successful. In the second, in a woman, the cyst suppurated and a free incision had to be made, when the numerous daughter-cysts gave rise to some difficulty, but ultimately the case did well. In ordinary cases he would draw off only half an ounce if the cyst contained about thirty ounces. A secondary enlargement often followed, and then the fluid became albuminous. Really nothing should be done for this secondary swelling, at least for some time, because gradual absorption was the usual consequence. If the swelling persisted for a long time, then further interference would become necessary. The second puncture was more dangerous, and apt to set up the very thing which it was our object to avoid.

MR. BARKER pointed out that in Russia, where cases of hydatid cysts were comparatively common, opinion was greatly in favor of performing the operation in two stages. He mentioned one surgeon who had not had a death in operations so carried out, whereas he had lost two patients by emptying the sac at once. He suggested that corroborative evidence on this point would be very useful.

MR. HOWARD MARSH related the case of a boy where he had cut down on the cyst and sutured it to the margin of the abdominal wound. Some weeks later he opened the cyst, and the lad had done remarkably well. In another case at St. Bartholomew's Hospital he had sutured the sac to the wound and left it for five or six days, and he felt very strongly that that was the better course to pursue. He said that it really did not amount to making two operations of it, for opening the sac was a painless proceeding. He added that the general opinion of English surgeons was in favor of the two-stage operation. He had aspirated in children several times, and in one or two cases no recurrence had taken place, but recurrence did sometimes take place.

DR. BROADBENT said that in a considerable proportion of the cases he had seen, simple aspiration had been sufficient to effect a cure. He could recollect at least half a dozen cases in which he had subsequently seen the patients. He mentioned that cysts varied in character, and said that he had remarked that when there were quantities of daughter-cysts suppuration was very likely to take place; whenever the fluid came away easily, retrogression might be expected. In one case the struggles of the child caused laceration of the walls of the cyst and escape of the fluid into the abdomen. This, however, was absorbed, and the child got well. He was unable to reconcile this case with that related by Mr. Treves.

DR. COUPLAND, in reply, said that most of the cases he had seen in which aspiration was employed either suppurated or refilled. One advantage of a free incision was that the presence of other cysts might be detected.

MR. EDMUND OWEN, in reply, said he was disappointed that the discussion had not turned more on the extension of the cysts into the thoracic cage. As to the best operation to be performed, he said that in abscess of the liver it might be advisable to open the sac directly, but, on the whole, he preferred the method of doing the operation in two steps. He thought that there was no necessity for waiting even for a few days, seeing that a few hours probably sufficed to obviate any danger of the fluid escaping into the abdomen.

MR. TREVES, in reply to the President, said the post-mortem examination of his case left no room for doubt as to its nature. He added that absorption did take place to some considerable extent.

CANCER OF THE UTERUS TREATED BY TEREBENE.

According to the Paris correspondent of the *Medical Press*, December 21, 1887, M. BETRIN recommends the use of terebene in epithelioma of the womb. After well syringing out the vagina and drying the parts with cotton-wool, plugs of this material steeped in the essence are placed firmly in apposition to the ulcerated surface, and maintained by larger plugs of dry cotton. Every second or third day the plugs are renewed according to the quantity of the discharge. As the consequences of this treatment it will be found that the condition of the parts is much improved, the fetid odor not at all so penetrating, the discharge much diminished, and the production of new vegetations retarded, consequently the hemorrhages are much less abundant.

CONSTITUENTS OF CASCARA SAGRADA.

While the value of cascara sagrada as a laxative in cases of habitual constipation is generally recognized, more or less objection attaches to its use from its bitter taste and the griping pains which it sometimes occasions. Recent investigations by MESSRS. H. F. MEIER and J. LEROY WEBBER (*Amer. Journ. of Pharm.*, February, 1888), by the promise which they give as to the recognition of the active constituents of this drug, will largely serve to do away with the present objections to its employment. In addition to the three resins, a crystallizable body, a tannic acid, and oxalic acid, a malic acid, a fat oil, a volatile oil, wax and starch, and a glucoside, differing from frangulin and emodin, as determined by Professors Prescott and Wenzell, the authors have found three other bodies whose influence, both in a pharmaceutical and physiological sense, would seem to be of decided importance. These are, first, a ferment; second, glucose; and, third, traces of ammonia.

The ferment alluded to seems to be identical with that existing in numerous other vegetable substances. While the isolation and ultimate analysis of this element must of necessity be deferred for some time, owing to the difficulty of obtaining it in a state of purity, yet it would seem that its effects are identical with those of the principle existing in cabbage, liquorice-root, in frangula, and, undoubtedly, in many other vegetables. Its presence in frangula does not seem to have been suspected hitherto, nor has its range of possibly mischievous action been fully appreciated. That this ferment, as it exists in cascara, is capable of producing griping or epigastric pain, the authors have absolutely demonstrated. The necessary steps have also been taken to obtain a supply of fresh frangula bark, in order to decide the question absolutely, as they are convinced that it is this ferment in the fresh bark which causes the undesirable results. The process appears very simple. If the undestroyed ferment be administered along with the laxative ingredients, as would be the case in a cold infusion, the same results follow as in the bark itself; that is, a generation of free acid, which, in the case of the stomach, would undoubtedly be lactic acid, and prove an unwelcome visitor when produced in abnormal quantities.

It would appear, therefore, that the removal of this ferment would largely serve to free cascara from its liability to produce griping pains. The importance of this ferment in a pharmaceutical sense will be recognized when it is stated that the authors have demonstrated that the ferment in question is operative from the moment that the bark is removed from the tree. It will follow, therefore, that a continuous decomposition and change is going on in this bark as well as in frangula. The means of removing the difficulty, and of obtaining a permanent bark which retains all of the medicinal activity in the highest degree, will be at once apparent, thereby enabling us to secure from decomposition the principle next to be considered, and render the bark absolutely permanent.

Although to the authors is due the credit of the recognition of this important fact, they show that a number of previous observers nearly reached the same conclusion by recognizing that decoctions of cascara might be taken without producing griping.

The glucoside referred to seems to be peculiar to *Rhamnus purshiana*, as the authors have been unable to determine its presence in the frangula bark as it occurs in commerce. This glucoside, though having very important functions and properties, has hitherto escaped a deserved recognition. A further examination of the fresh bark promises to confirm the existence of a remarkable difference between these two barks, and inasmuch as experience has demonstrated that *Rhamnus purshiana* exerts a decided and unmistakable tonic effect, the authors are inclined to ascribe these properties to the bitter, crystallizable principle already spoken of. Physiological tests to determine the actual properties, not only of the bitter substance, but of the comparative laxative power of the different resins, are under way. The glucoside may be obtained in a comparatively pure state for examination by precipitating an aqueous infusion or percolate from cascara with subacetate of lead. After removal of the excess of lead by H_2S, the solution exhibits a remarkable decomposition when boiled with sulphuric, hydrochloric, or lactic acids. The solution becomes intensely bitter, turbid on cooling, and a microscopical examination indicates the presence of a substance, insoluble in water, of an oily or resinous behavior, and also crystals of the bitter substance referred to. This oily or resinous body seems to be an excellent solvent for the bitter principle, inasmuch as on cooling, fine crystals may be seen distributed through it. It is evident from the behavior of this solution that the ferment has been separated, and it is therefore precipitable by subacetate of lead.

The glucose, which is present in varying

proportions, according to the age of the bark, plays a very important part in the pharmacy of cascara. As a medicinal agent it is certainly inert in common with vegetable albumen, the starches, etc., and is even capable of producing much mischief by undergoing the process of fermentation under favorable conditions. That the glucose is the active element in producing the very undesirable "falling," as referred to by Mr. Butterfield in the *Pharmaceutical Journal and Transactions*, 1887, p. 473, is very evident; that an extract containing a liberal quantity of glucose may, in the process of manufacture into a pill, gather on its surface a small army of ferment-germs with the natural result, will not be denied. The glucose decomposes into alcohol and carbonic acid, and it is not a matter of wonder that the pills get soft.

While it may be possible to destroy these germs by the application of some impermeable varnish to the pills, it is evident that the removal of the glucose previous to the manufacture of the pills is much preferable.

The traces of ammonia which the authors have been able to find remaining in the bark indicate that this ingredient has undoubtedly a distinct function, which appears to be that of rendering the resin soluble and transportable for the purposes of the plant. In this respect it is very analogous to liquorice-root, inasmuch as careful observers have already noted the absence from old liquorice-root of the sufficient amount of ammonia to render the glycyrrhizin, or sweet principle, entirely soluble in water, and have even advised replacing it by exposing the root to the vapors of ammonia in a suitable closed vessel.

While ammonia may be the active agent or base in the plant itself, a point which the authors appear to have determined by examination of the fresh bark, it would seem that for pharmaceutical purposes other alkaline bases are preferable; for it is difficult to concentrate by evaporation a neutral ammoniacal extract from either liquorice or cascara without loss of a decided quantity of the volatile alkali, inasmuch as the organic acids seem to have but a feeble affinity for it, insufficient to resist the dissociating action of the temperature employed in evaporation. Like results would undoubtedly follow an attempted concentration of some other salts of ammonia with organic acids, as, for instance, the endeavor to reduce volatile liniment to a solid form.

The authors promise a full report as to the ultimate analysis of the glucoside, as well as of the bitter principle, together with the source of the acid produced by the action of the ferment, whether it be glucose, albumen, or amyloids alone or together, with the consideration of the ultimate fate of the ferment, together with its function in the plant. These researches we may further expect may throw some light upon the formation of resins in the plant, and thus enable us to understand the important natural basis, while the existence of glucose in the bark would seem to show the continual occurrence of fermentation in the apparently inactive bark. Enough has, however, been shown, even in this preliminary communication, to indicate that the laxative properties of cascara are inherent in the resins, while the tonic effects are due to the crystalline bitter principle. The more complete the analysis of the plant, and the more thoroughly the property of the different ingredients is determined, the greater will be the prospect of success in recognizing the active principle on which its therapeutic value is due, and so leading to the employment of concentrated preparations free from all extraneous and detrimental substances.

OIL OF TANSY.

A curious effect has been observed by M. PEYRAUD to result from the administration of oil of tansy, *Tanacetum vulgare* (*Compt. Rend.*, cv. p. 525). The symptoms produced by it in animals almost exactly resemble those of hydrophobia, such as hallucinations, convulsions without loss of consciousness, episthotonos, spasm of the pharyngeal muscles, of the larynx, and of the whole of the thorax, abundant salivation, asphyxial phenomena, sensorial excitability, tendency to bite, the characteristic cry, diminution of sensibility and movement, momentary paralysis, bloody mucous foam from the windpipe and bronchial tubes, subpleural hemorrhage, and hemorrhagic infarction of the liver.—*Pharm. Jour. and Trans.*, December 3, 1887.

Reviews.

A MANUAL OF MEDICAL JURISPRUDENCE, WITH SPECIAL REFERENCE TO DISEASES AND INJURIES OF THE NERVOUS SYSTEM. By Allan McLane Hamilton, M.D., one of the consulting physicians of the insane asylums of New York City, etc. With illustrations. New York: E. B. Treat, 771 Broadway, 1887.

The brochure of Dr. Allan McLane Hamilton contains in it nearly five hundred badly-printed pages, whose whole appearance is that of being cheap and nasty, but whose

contents will be found very satisfactory. Dr. Hamilton's diction is clear and good, and he has evidently read widely and thought much on the subject upon which he writes, and collected cases industriously. After reading most of the book, we reach the conclusion that its teachings are sound, and that it is a very good guide for the medical jurist, as far as it reaches. It is, indeed, really a work on diseases and injuries of the nervous system in their relations to law, and not a general work on medical jurisprudence. Thus there is no discussion of such an important subject as rape, while sexual perversion practically receives no consideration save the statement that it may occur after injuries to the head. On the other hand, there are certain subjects which have little connection with nervous diseases that are discussed in considerable length, such as the subject of suicide, to which a whole chapter is devoted. It is sincerely to be hoped that Dr. McLane Hamilton, when this his most recent offspring reaches the dignity of a second edition, will send it forth to the world not clad in beggarly rags, but in some form worthy of its paternity.

A Practical Treatise on Materia Medica and Therapeutics. By Roberts Bartholow, M.A., M.D., LL.D. Sixth edition, revised and enlarged.
New York: D. Appleton & Co., 1887.

The work of Professor Bartholow is so well and favorably known to the American medical profession that it requires at this time no further discussion by the pen of the medical reviewer. We note from the preface that the additions have been so numerous that one hundred pages have been added to the size of the book. The rapidity with which therapeutics now travel is illustrated by the fact that nearly two pages are devoted to the consideration of stenocarpine, although even at the time of its writing some suspicion attended the new drug! At present we suppose stenocarpine would be dismissed by any writer on therapeutics as an alkaloid very problematic in its existence. The classification employed remains, we believe, unchanged, and illustrates very well the statement made by Professor Bartholow in the preface to the second edition, that at present no scientific classification of drugs is possible. Metallotherapy is discussed under the head of "agents increasing waste."

Health Lessons. A Primary Book. By Jerome Walker, M.D.
New York: D. Appleton & Co., 1887.

We judge from an examination of the contents of this book that it is intended for the instruction of children from ten to thirteen years of age. The first question which always arises in regard to such attempts is, Are the statements accurate and the sentiments sound? We have gone over the little brochure carefully, and find that all its statements are accurate and that its teachings are good. The next point is as to clearness. It seems to us that everything in it is so clear that it will be easily understood even by the most youthful intellect. Then comes the element of picturesqueness. In this the little book seems to excel; especially are the illustrations original and very taking. The editorial judgment on the work, therefore, is that it is a good one, and will arrive at success; but the editors, although in their own opinion able to estimate the value of a purely scientific or medical book to the ten-thousandth of a grain, are humble in estimating their own powers in regard to such a work as this. One thing is certain. If it does please the children and the teachers of the young, it will have a very large sale. The proof of the pudding will be in the eating. As a straw, seeing which way the wind may blow, we may say that we submitted it to the careful judgment of a bright little girl of eleven, and this is what she says, "I think it is a nice book as far as I know." She was certainly eager to possess the volume.

Bradley's Atlas of the World for Commercial and Library Reference. A complete American and Foreign Atlas, combined from official State, National, and International Surveys, supplemented by Information furnished by the Postal and Interior Departments of the United States, and from many reliable private sources. Officially approved and adopted by the Departments of the United States Government. With isometric Index to each Map.
Philadelphia, Pa.: Wm. M. Bradley & Bro., Publishers, 1026 Arch Street, 1886.

To any one of our readers who wish a large first-class atlas we can commend the one which lies before us as very extensive and very complete, and, so far as our knowledge serves us, very accurate in regard to those portions of the world in which close surveys have made a positive knowledge of the geographical details possible. The book is divided into two parts,—the first, the eastern hemisphere, contains thirty maps; the second, the western hemisphere, forty-five maps, making seventy-five maps in all. Each map is accompanied by an analytical index, which renders the finding of any desired point extremely easy. We notice that the publishers have availed themselves of the

latest researches in the maps of Palestine and of Africa, and that the railroad system of Mexico is completely exhibited. We do not know of any other atlas at once so complete and so recent.

ANTOINE DE STÖRCK.—ÉTUDES DE THÉRAPEUTIQUE EXPÉRIMENTALE. Traduction nouvelle, Introduction, et Notes par le Dr. H. Piedvache, Ancien Interne des Hôpitaux de Paris.

Paris: Librairie J. B. Baillière et Fils, Rue Hautefeuille, 19, près du Boulevard Saint-Germain, 1887. Tous droits réservés.

The activity of Antoine de Störck, who was born in 1731 and died in 1803, in the investigation of narcotic remedies is known almost to every student of medicine. That the French nation, however, is longing for a translation of his works is a proposition the truth of which to our thinking is not probable. However this may be, such translation is before it in the form of a handsome brochure, which may be consulted with pleasure, and probably with profit, by every student of the history of therapeutics, and from which, no doubt, may be gleaned a few small truths, which have hitherto escaped the search of modern therapeutic writers. The work is a large octavo, of a little over four hundred pages.

Correspondence.

BERLIN.

(From our Special Correspondent.)

In the October number of last year's THERAPEUTIC GAZETTE your Paris correspondent spoke of an account of a series of experiments on the effect of various drugs upon hypnotized persons, which Professor Luys had given the Medical Academy of France. While this question has been widely discussed in France, and numerous articles have been published by French authorities, the question of *hypnotism* has also been revived in Germany, its value and importance in therapeutics being the principal points of discussion and research.

Dr. Moll, a young physician in Berlin, who had just returned from a trip to France, delivered a lecture before the Medical Society of Berlin on his experiences in the clinics of Charcot in Paris and Bernheim in Nancy, together with an extensive account of interesting facts which he had gathered during his stay there. His rather enthusiastic address, which showed that he was still strongly influenced by what he had observed in France, led to a discussion, which soon showed that the medical profession in Germany is as yet not willing to take for granted the adventurous assertions made by French authorities. Still less do they feel inclined to immediately introduce *hypnotism* into therapeutics on the strength of such uncertain experiments. Professor Ewald, director of the Siechen Institute (Siechenanstalt) in the city of Berlin, made a long series of experiments on the inmates of the above institute. He states that in no way was he able to produce hypnosis, except "the kind that old ladies are subject to." The professor states that "polished buttons and knife-points steadily gazed upon for half an hour, and even an hour, had not the slightest effect." In two cases only was Dr. Ewald able to produce a hypnotic condition, and these were in two hysterical patients. With these he tried the "suggestion" experiments, but without success. Professor Ewald, who also had had opportunity of witnessing the experiments of Charcot, states that the ease with which these conditions are occasioned in Paris, and all over France, is doubtless due to the highly developed nervous character of the individuals experimented upon. For generations the physical conditions which are necessary to permit of hypnotism have been inherited. Above all, however, Dr. Ewald protests against the classing of hypnotism among other scientifically therapeutic methods, as is now being done so extensively. At present we can only speak of it as an experiment, and there is no harm in watching and studying the extent of psychopathic influences upon different individuals; but a "therapeutic method" can only be such where a careful series of conclusive and scientific experiments prove the existence of curative powers or properties.

Other speakers, among whom is Professor Mendel, have also warned the profession against the adoption of hypnotism as a therapeutic method, as such a procedure would be entirely unwarrantable. Dr. Mendel might speak of his own experiences, as he has found that healthy patients subjected to the hypnotic influence always suffer from nervousness afterwards, while the nervousness of nervous patients is very greatly increased by it. The physician should, therefore, carefully consider, before using or attempting to use this method, whether or not it might be of injury to his patient. This consideration would naturally lead the practitioner to first try the effect of various harmless therapeutic

agents before attempting the use of hypnotism and the "suggestion" method. In all cases in which Mendel has observed so-called "cures" resulting from the use of hypnotism, the effect has at the best been only a temporary one.

Several interesting contributions on the subject of *artificial nourishment* were brought forward in the last meeting of the Society for Internal Medicine, just before the Christmas holidays. Dr. Leyden brought two patients before the society who were suffering from carcinomatous stricture of the œsophagus, and who, in his clinic, had for a long time been fed artificially by the English method recommended by Dr. F. Symonds (*British Med. Journal*, April 25, 1887).

The method is as follows: If the stricture is only about three centimetres long, and situated in the lower or middle third of the œsophagus, then hard rubber tubes, about three to five centimetres long, are introduced into the stricture; to these silk threads are attached, by which they may be eventually drawn out. In such cases of œsophagus stenosis, which are situated in the upper third of the œsophagus, and specially in the vicinity of the cricoid cartilage, and which are longer than three to four centimetres, elastic tubes are preferable to those of hard rubber. These are made similarly to œsophageal sounds. They must, however, be frequently renewed, as they soon become broken.

Before the insertion of these tubes it will be necessary to treat the œsophagus antiseptically with gargles and washes, as the surface will be ulcerated, and also as above the stricture the œsophagus is usually enlarged. During this time the patient should be fed *per rectum*. Then, by means of most careful sounding, the stenosis should be opened.

The hard rubber tube which is to be introduced should have two holes opposite to each other, to which are fastened two stout silk threads; the tube should then be drawn over a whalebone mandrin, by means of which it should be placed in the stricture, and manipulated in the same manner as one would a common sound. When the rubber tube has been placed in the right place, the mandrin may be drawn out, and the silk threads, which are still hanging out of the mouth, should be wound around the ear, or may be passed through the nose. Similarly, in other cases, where the stricture is seated higher up, the elastic tubes may be introduced into the stricture. Through these tubes fluid nourishment can easily be swallowed. Should the tubes become stopped up, they may be drawn out by means of the silk threads, cleaned, and again introduced into the œsophagus. If, in consequence of the dilatation of the stricture, it be thought advisable to substitute a tube of larger calibre for the one in use, this can easily be done by removing the old tube and inserting in its place the larger tube, which should be prepared in the same manner as the first tube.

It sometimes may happen that, when using elastic tubes, the tube becomes softened by the heat of the body, and the silk strings cut through it. In such cases the only thing which can be done is to push the tube down into the stomach.

In this way the two patients in Dr. Leyden's clinic had been treated with marked and exceptional success. The first patient has worn the tube in his œsophagus now for over six months.

The nourishment which he takes is entirely confined to fluids. On several occasions, when he has tried to swallow some finely-hashed meat or cake, the tube (which is only the thickness of a goose-quill) immediately became stopped up. Seven months ago, when the patient was first admitted to the clinic, he only weighed 42.5 kilogrammes, and thinned down at first to 41.5 kilogrammes. After six months of nourishing, he now weighs 49.16 kilogrammes. His increase in weight has, therefore, been 8 kilogrammes (16 pounds).

The second patient was a healthy and strong man, aged 50, who was suffering with well-defined carcinomatous stricture of the œsophagus. He was twice treated by artificial nourishment. The first time for two months, during which period his weight increased from forty-nine kilogrammes to fifty-nine kilogrammes, showing an increase of ten kilogrammes. After having been discharged and returned to his home, the tube accidentally became stopped up, but the patient did not return to the clinic until his weight had decreased to forty-six kilogrammes.

Having been admitted again to the hospital, the tube was again inserted, and in about seven weeks his weight increased to sixty kilogrammes. When one considers that in most such cases death results in a few months from exhaustion, then, surely, the success of this artificial nourishing will be duly appreciated.

At the same meeting of the Society for Internal Medicine, Professor Sonnenburg re-

ported a case of stricture of the œsophagus, whose nourishment had been accompanied by still greater difficulties. The case was that of a patient suffering from a most severe carcinomatous contraction of the œsophagus. So tight was the stricture that even the smallest sounds could not be passed, and every attempt at sounding gave rise to copious bleeding. The patient (a lady) had fallen away to a mere shadow, and was so weak and exhausted that she was powerless and unable to move. As a final resource gastrotomy was performed. The fistula was made close to the cardia, which was the best possible location from which to introduce nourishment, as when the fistula is situated near the pylorus the nourishment is apt to be discharged again through it in consequence of the peristaltic movement.

Dr. Sonnenburg considers it advisable not at once to open into the stomach even after it has been stitched fast, but to wait for a few days. He stitched the serosa to the parietal leaf of the peritoneum, and then stitched the peritoneum fast to the external wound. Then for a few days the patient was nourished by rectal injections, after which the stomach was opened by means of a "Paquelin cautery."

A very small opening suffices; a small drainage-tube should be inserted. For the first few days the patient should be nourished through this opening by means of a small tube, and then, after the opening has become larger, a "Sedillot" canula should be introduced.

It is now five months since the above-mentioned patient was operated upon, and during that time she has so far recovered that she is up and able to walk about, and can even go up and down stairs without assistance. The canula is fastened in its place by means of an elastic band which goes around the body. The removal and cleaning of the canula is not often necessary, but when it is removed a duplicate canula is immediately inserted. Immediately after the operation the patient was nourished with peptone soups, and not until the fifth day was any other nourishment given, which is always well and sufficiently digested.

At present the diet of the patient consists principally of the following: At eight in the morning, milk, white bread. The latter is cut into small pieces, chewed, and then spit out, and every morsel mixed with milk. At eleven o'clock in the morning, one-third litre of peptone soup, two raw eggs, and a glass of heavy wine. In the afternoon, at two o'clock, meat finely chopped with bouillon, one glass of beer, and a little sugar. At five o'clock in the afternoon the same as in the morning. At eight in the evening, barley soup, with a little egg and a small glass of beer.

PARIS.

(From our Special Correspondent.)

The *poison of expired air* has been the object of painstaking investigations on the part of Drs. Brown-Séquard and D'Arsonval. Although the question cannot be said to have been completely elucidated, much instructive information was supplied in a series of communications made by them to the Paris Biological Society and Academy of Sciences Until now all that was known respecting the air breathed out was (1) that it nearly always contains ammonia; (2) it contains minute proportions of organic matters, either already decomposed or having a tendency to rapid putrefaction; (3) in a close room, air loaded with pulmonary exhalations is very injurious, even when it contains only one per thousand of carbonic acid, a proportion harmless under other circumstances. From the foregoing well-known facts, and especially the last, the presence of one or more toxic substances in expired air could be suspected with good reason, but positive proof was necessary, and this was obtained as follows: The vapors held in air exhaled from the lungs of a healthy man were condensed, and the liquid was filtered through paper. On injecting from six to seven grammes of the liquor into the vascular system of a four-pound rabbit the following symptoms were uniformly observed: More or less decided dilatation of the pupil; a slackening, often very considerable, of the breathing-functions; lowering of the temperature by from 1° to 10° F.; paralytic weakness, in most cases excessive, especially of the posterior limbs. The after-effect observed, three or four days subsequent to the operation, was a morbid activity of the heart, lasting two or three weeks, and often causing as many as 240 to 320 pulsations to the minute, although the temperature remained almost unaltered. And, lastly, a stout rabbit died within barely one minute after the injection of fifteen and one-half cubic centimetres (half an ounce) of liquid condensed from the pulmonary exhalation of a large, healthy dog. The symptoms were tetanic convulsions, and almost complete stoppage of breathing and heart-beating. The proportion of poison in

the liquid must be very small, since, according to Arthur Ransom, the air expired by a man contains only three grains of organic substances in every twenty-four hours. Further experiments showed that even the blood of animals poisoned with the condensed liquid was poisonous and could kill other rabbits. As a point of comparison, it may be here stated that Dr. Brown-Séquard ascertained that no less than one hundred and eighty grammes (six ounces) of water had to be injected to kill the sort of rabbits experimented with. The poison of expired air not having been isolated, its nature could not be determined, but there is good ground for thinking it is a volatile alkaloid secreted by the lungs. The reasons are, first, that the condensed liquid has an alkaline reaction; then its poisonous properties are not destroyed, but, on the contrary, increased, when boiled in a close vessel,—a fact, by the way, showing that we are not dealing with microbes; and, finally, the *ensemble* of the toxic phenomena observed when the liquid is injected either into the blood or under the skin of the rabbit are quite characteristic. Although the investigation related by Drs. Brown-Séquard and D'Arsonval is not complete, and their deduction from the alkalinity of the condensed liqnid may be questioned, yet it must be admitted they have added important facts to our knowledge of animal poisons, the chemistry of the future.

At a subsequent meeting of the same Biological Society, M. Würtz, of the Paris College of Pharmacy, remarked that the papers read by Drs. Brown-Séquard and D'Arsonval compelled him to say a word of his own experiments, although they were still far from complete. He had approached the same subject, but started from another direction. He had begun a chemical examination of expired air by running quantities of it through a ten per cent. solution of oxalic acid, precautions being taken to avoid the introduction of saliva or solids. This solution had been then treated by a process of his own, to be at a future time described, so as to separate the compounds formed in the shape of hydrochlorates. Among these, ammonium chloride largely predominated, but he had also observed the hydrochlorate of a volatile base not obtained in quantity sufficient for analysis. So far he could only say the base in question affords all the chemical reactions of alkaloids, and its hydrochlorate, on being heated to 100° C., gave out a peculiar aromatic odor *sui generis*. Professor Würtz insisted he mentioned his unfinished experiments only so as to be able to claim priority.

From animal poisons to microbes the transition is easy. Pasteur has not discovered a new sort of microscopic creature, but his doctrines have received a striking confirmation from an unexpected quarter. And here, again, poor bunny was the victim; in fact, the association of ideas is such that one can scarcely hear the word "microbe" without at once thinking of rabbits. The readers of the THERAPEUTIC GAZETTE, no doubt, have heard of the rabbit nuisance in Australia, and the unavailing efforts made to abate or even limit the infliction. As a last resort, Pasteur was thought of,—Pasteur, the man who breeds and trains microbes as others do dogs or horses. On being appealed to for a well-drilled microbe that would stop the rabbit invasion, after everything else had failed, he said the chicken-cholera microbe would likely answer, and he offered to prepare the *bouillon d'onze heures* that was to do the business for the Australian rabbit. Whether anything has come out of the correspondence is not known here, but a case which has occurred within a hundred miles from Paris shows that prussic acid, arsenic, and osmic acid are mild placebos in comparison with Pasteur's infectious microbes. The facts are as follows: The owner of a twenty-acre lot, enclosed with walls, in the neighborhood of Reims, was greatly troubled with rabbits, which had found convenient quarters in crevices and holes of a soft chalkstone underground. They had multiplied to considerable numbers, and caused great damage; but neither shooting nor ferrets were of any avail, when the owner, Mme. Pommery, thought of applying to Pasteur. As the action of the New South Wales authorities had been alluded to in the French papers, it was believed Pasteur would like to try his system at home, when he had a chance. He accepted the invitation, but, owing to slight illness, sent in his stead his nephew, M. Loir, with six litres of his best chicken-cholera "bouillon." The stuff was, on December 23, poured on some hay placed near the burrows. The next morning nineteen dead rabbits were found lying about. On Christmas-day no one went near the warren; but, on the 26th, twelve more dead bodies were discovered, and no trace of a living rabbit could afterwards be perceived. Later on, in January, no animal making its appearance, holes were dug down to the burrows, and there groups of five, six, or ten rabbits were found dead in various places, all victims of the virulent epizootic

caused by Pasteur's bouillon. His microbes had made a clean sweep of poor bunny.

A recent occurrence in Lyons has confirmed MM. Arloing and Cazeneuve's conclusions, mentioned in the THERAPEUTIC GAZETTE of July, 1887, respecting the poisonous character of some *aniline dyes*, and the harmlessness of others. Almost an epidemic happened last November with female spoolers working a particular yellow cotton yarn used for gold-lace-making. Dr. Carry, of the Lyons Medical Society, who was the first to notice the accidents, on being called to attend a spooler, found the patient suffering from a complication of obscure complaints. The most apparent symptoms were weakness, dyspepsia, and vomitings, coupled with a bluish-gray coloration of the gums, extending to the inside of the lips. As the yarn on winding emitted considerable yellow dust, and other working-girls were similarly affected, the physician was soon on the right scent. He found that while the accidents were caused by the dye, some yellows were very poisonous, others less so, and some quite harmless. One sort, giving out much dust, was so dangerous that one working-girl had lost within a short time two canaries and one cat. The bird's cage hung near her machine, and the cat had probably swallowed the deadly dust with her food. Next it was found that in a shop, where many girls were employed, no accidents were noticed last summer while the windows could be kept open, but the trouble began in November and December, when they had to be closed. With the new patients Dr. Carry had full opportunity to observe all the symptoms. Besides those already mentioned, which mostly relate to the digestive functions, others pertaining to the nervous system were noticed, such as persistent cephalalgia, insomnia, and an analgesis of the skin so complete that pin-pricks could not be felt. At the same time the circulation was normal, there was no fever, and no albuminuria. Some twelve or fifteen women were under treatment for the same complaint, and the recovery was in all cases very slow. But the accidents were too evidently caused by some poison to be thus dismissed without further investigation. Lead, the first that suggested itself, was looked for by a Lyons pharmacist, but proved absent. Three different specimens of dust were next given for thorough analysis to a specialist,—Professor Pouchot, of the Martinière school,—who confirmed the absence of lead, but found traces of antimony used as a mordant. The first specimen, the most poisonous, was found to have been dyed with *sodium binitronaphthol*, generally known in trade as *Martin's yellow;* the second, less poisonous, with Poirier's light binitro-naphthol; and the third, quite harmless, with sodic sulpho-conjugated binitro-naphthol. Experiments on animals confirmed the chemist's report. Dr. Carry did not feel justified in concluding that goods thus dyed are dangerous to the wearers, but they are certainly to the weavers; and since yellows, equally good but harmless, can be obtained at a slightly higher cost, he thought the poisonous dye-stuffs should be prohibited, or such ventilation enforced as to protect the working-people from the dangerous dust.

The numerous domestic uses of nickel-plated ware impart renewed interest to the *harmlessness of nickel compounds*, a question at one time much controverted. Chemically, the metal stands between iron and copper, so that it was naturally expected its physiological properties would resemble those of either one of the cognate metals. But here the difficulty began, since cupric compounds are poisonous, while ferrous and ferric are not. When nickel was first discovered it was generally considered even more poisonous than copper, as may be ascertained by consulting old chemical treatises. But a gradual change has come over scientific opinion. The poisoning cases on record, formerly attributed to nickel compounds, were in later years suspected to have been due to the arsenical impurities known to exist in all German nickel-mines. Next, the fact that no accident has resulted so far from the numberless nickel-plated articles in daily use is very strong evidence that, if nickel is a poison, it must be very slow poison. And now, to decide the question upon scientific grounds, Professor Riche, of the Paris College of Pharmacy, intends to renew the investigation from the beginning. It may, by the way, be remarked that France is interested in the subject, as her New Caledonian colonies contain rich nickel-mines, entirely free from arsenic. M. Riche, at a recent meeting of the Academy of Medicine,—he is a member of the learned body,—read a paper describing some preliminary experiments made on animals. The following may be quoted: 1. Large doses of nickel acetate were given to a guinea-pig without causing death. 2. A dog was given half a gramme (eight grains) of acetate of nickel every day for fifty days. At the end of the experiment twenty-five grammes (six

and a half drachms) had thus been administered, and the animal appeared quite unconcerned. 3. The same experiment was tried on another dog, beginning with half a gramme a day, which had no more effect than on the first animal. The dose was next gradually increased to three-quarters of a gramme, one gramme, and finally two grammes, when the animal showed signs of sickness. The symptoms were vomitings, persistent diarrhœa, and semi-ataxis of the hind-quarters. But they soon disappeared on reducing the dose to half a gramme, when the dog, who had lost flesh, began to recover his usual condition. Lastly, the animal was killed, and a post-mortem held, which showed no internal lesion of any sort. Professor Riche admits the conclusions reached are not final, since it is not always safe to thus pass from dog to man, but they may be considered sufficient to show that nickel compounds much resemble iron salts, and in all probability offer no danger in minute quantities.

A case of death from *leprosy* has just been recorded in Paris. The patient died in the St. Louis Hospital, where they make skin-diseases a sort of specialty. According to the report made to the Seine council of hygiene (*Americanize*, board of health) by Dr. Lancereaux, who was present at the post-mortem, the case was one of true leprosy. The deceased, a sea-captain and merchant, had lived successively in Mauritius, Reunion, Madagascar, Mahé, Ceylon, and lastly in Texas, where he experienced the first symptoms of the disease. On returning to France, he was, six months after the complaint had shown itself, treated first at the Nantes Hôtel-Dieu, and afterwards sent to Paris, where he was placed in Dr. Besnier's service, at the St. Louis Hospital. Although it is hardly possible to say where the disease was contracted, Dr. Lancereaux was positive it had a foreign origin, and no signs of contagion were observed in the Nantes or Paris hospitals, where the patient had spent a number of months.

PARIS, January 20, 1888.

LONDON.

(From our Special Correspondent.)

The term Therapeutics includes treatment of every kind, and the THERAPEUTIC GAZETTE consistently advocates the employment of every salutary influence—whether pharmacological, dietetic, physical, or psychical—in the treatment of disease. I am sure, therefore, that you will agree with me when I maintain that it is wellnigh impossible to make too much use in hospital and infirmary practice of the wholesome pleasures which the poor so seldom enjoy at home. One of the features of the remarkable advance in our social condition that characterizes the Victorian period of English history is the powerful effort that has been made to increase the brightness and happiness of the lives of the poor. The reality and activity of this movement have been abundantly illustrated in our wards during the Christmas season. The resident medical staff, the ward sisters, and the students have vied with each other in providing entertainments for the patients. The residents get up concerts and various other forms of quiet amusement. The sisters decorate their wards gayly, and organize the distribution of useful gifts to every patient. The students also provide concerts or theatrical performances for the patients who are able to leave the wards, and at the same time invite a few of their own friends to witness their histrionic efforts. All this has the best effect both upon the inmates and upon the supporters of our hospitals. These entertainments bring together those who support our hospitals, those who manage them, and those who take advantage of them in sickness. Such influences can be only for good in every way; and it is the general experience of our resident medical officers that patients are "all the better" and rarely the worse for their Christmas festivities.

The efforts that I have mentioned to make the time spent by the sick in hospitals more happy are not confined to the Christmas season. In some of our hospitals entertainments, given mainly by musical friends of the charities, are carried on throughout the whole winter on regular evenings. In summer, when there is less need for such means of passing the time, there is less active effort displayed to amuse the patients; but this is the time for the enjoyment of the gardens, of which some of our hospitals can boast. There the less severe cases may be seen taking exercise and enjoying the air and the sunshine, the trees and the flowers, or gathered in interested groups round some voluble *raconteur*, who is telling his adventures beyond the seas, or around some animated politician, who is airing his views on the endless Irish question.

Within our wards the provisions for the enjoyment of every-day life, both by the patients and the resident officers, have greatly increased in the last few years. I do not know

how it was with you in the States, but here in England the older of us can remember the days when wards were something worse than uninviting, when they were positively forbidding. The walls were covered with a cold comfortless whitewash, and their monotonous lengths were broken only by an occasional text in letters of obtrusive dimensions, too often conveying to the poor patients a sentiment of hopeless prognosis both in this world and in the world that is to come. These are now entirely swept away, or they have been so changed in character and reduced to such small dimensions, or illuminated in such artistic fashion, that they please the eye while they appeal to the tender emotions rather than to fear or despair. There are but few wards that have not a pleasing show of engravings and colored prints, hung on walls, of a cheerful and yet restful tint. Our ward-tables are covered in summer with sweetly blooming and smelling plants. As for literature, the supply of books and papers is endless; and one of the favorite occupations of our daughters these long winter evenings is to make pretty scrapbooks for hospital children.

By these means and others of an allied kind the pleasures of art and literature are made to surround our poor patients and to work their wholesome influence upon them. The very consciousness that they are cared for in this way must have no mean therapeutical effect on the sick. Surely in these days our results must be better than the results of our predecessors, even if never a drop of physic were prescribed and the hygiene of our hospitals were no improvement on their sanitary condition of twenty years ago. We ought to value these influences more highly than we do. We ought to be more active in promoting their wider development. I am afraid we have to confess that—here in England at any rate—the movement that has introduced the æsthetic into our wards, that is, into practical therapeutics, did not take its rise within our ranks, but among the wisest and most cultured of the laity.

Speaking of the influences that are powerful for good in the treatment of disease, I am reminded of a very pretty little war that is being waged at this moment in the columns of the *Times* on the subject of homœopathy and medical intolerance, or, as they call it, *odium medicum*. The discussion originated in a difficulty in connection with the practice of one of the staff of a fourth-rate London hospital, but it has already assumed large dimensions. I need hardly say that, beyond a great deal of amusement, no good promises to come out of this controversy,—at any rate, none of the disputants on either side show the slightest indication of being otherwise moved than to hold more firmly than ever to their respective opinions. And I question how far the public are instructed or benefited by the perusal of all the *pros* and *cons* of "allopathy" and "homœopathy." For myself, I should say that the time has not yet come for crushing the Hahnemannian heresy by arguments that will appeal to the non-professional public. Premature generalization always has a powerful attraction for those persons who have a dangerously little amount of science in their heads. While we of the orthodox school are laboring to find a way to pharmacological and therapeutical principles, by the faithful observation and record of perhaps the most complex of all natural phenomena, these persons have taken a near cut to the goal in company with Hahnemann, and abuse us for not resting contented with their position as the end of all physic. Neither do I think that this particular time is favorable to the disappearance of a cut-and-dry simple system like homœopathy. One of the features of the last quarter of the nineteenth century is the development of time-saving and labor-saving instruments and systems. We must have everything done quickly, definitely, and accurately: we finish with it and turn to something fresh, whether it be work or pleasure. Homœopathy appeals strongly to the public in this direction, as has been shown by the discussion in the *Times*. A distinguished public man, who espouses the heresy, says he will have none of our elaborate pathology and diagnosis. He has a pain in his side, or he has a diarrhœa, and what he wants, what he considers the perfection of therapeutic art, is to run his finger down parallel columns of a therapeutical index, find the drugs that combat these symptoms, and (if I may be permitted the expression) put himself on the therapeutic file straight away and have done with it. He has no patience with an orthodox physician who insists on saying that a pain in the side is but a symptom which may point to any one of a number of serious pathological conditions, and which calls for a careful physical examination. He despises the "allopath" who begins the treatment of diarrhœa with an inquiry into the probable cause. These proceedings, say our distinguished but impatient man of the time, give but a poor account of modern science. Science shortens labor and saves time: so-called modern medicine has enormously increased labor and consumes an

inordinate amount of time. He cannot regard this as a proper or a sound system: what he wants is to be *cured*—and that right away.

There is a great deal of force in all this, though not a particle of reason. The truth is, as I have frequently told you in these letters, that the reaction from the old system of heavy-physicking to the present system, which is followed by some of our most distinguished clinicians, of no-physicking, has brought orthodox practice into something like disgrace. The enthusiastic prosecution of pathology during the last thirty years has attracted many of our most active minds from therapeutics. We cannot blame those who have been thus led away. We do not find fault with builders who insist on laying a solid foundation before they proceed to erect the towers and pinnacles. But while many of our best laborers have been thus employed, there has been a rare opportunity for the Hahnemannians to set up a bogus building, spick-and-span in the beauty of its completeness, for the public to gaze at and admire. Let us have patience. Our therapeutical structure is rising steadily, if slowly, from a base that cannot be shaken. The time will come, but certainly not soon, when men will practically acknowledge the soundness of scientific therapeutics, as they are now practically adopting in every home the modern science of hygiene, the greatest triumph so far of pathology and pharmacology,—a science, by the way, to which the homœopaths have contributed next to nothing.

A wonderful amount of success has attended the latest effort that has been made to establish a post-graduate course in London. I am told that as many as one hundred and thirty practitioners have availed themselves of the class that has been started with great energy at the Charing Cross Hospital. It is surprising how little had been done up to the present towards organizing the endless opportunities for clinical instruction which London affords for the benefit of qualified men. I often lament the amount of difficulty that your countrymen who visit us must experience in attempting to attend the practice of our hospitals. Such a thing as a concerted course of instruction for this class of students, whether in separate or in associated hospitals, has hitherto been unknown. Perhaps I ought to say it is still unknown, for the post-graduate course at Charing Cross Hospital appears to provide instruction but once a week for one or two hours. We constantly boast that London is the largest field in the world for clinical study and instruction, but we offer very few attractions either to our own or to foreign graduates who wish to avail themselves of these advantages. Visitors are always welcome to come freely and make the visit with the hospital staff, and I trust every American who comes here carries back with him pleasing memories of his reception. But this casual if agreeable courtesy is not all the attention your countrymen and our young colonial graduates want. If they go to Vienna they will find regular classes provided for them, beginning and ending at definite dates, short but systematic, and thoroughly practical. No such course exists with us. If our younger hospital men were a little more alive to this serious want, surely there ought to be no difficulty about arranging courses at some of our great special hospitals, with or without the co-operation of one or more of the most important general hospitals, such as St. Thomas's. The truth seems to be that our hospital physicians and surgeons find the work of the medical schools attached to their respective institutions already as much as they can afford time for. We must look, I suppose, to some of the special hospitals to take up this question, which is certainly an important and pressing one.

CHRONIC LEAD-POISONING.

To the Editors of the THERAPEUTIC GAZETTE:

GENTLEMEN:—In one of the "Leading Articles" in the December number of the GAZETTE, entitled "Chronic Lead-Poisoning," I find an excellent criticism of a method for detecting lead in urine, which was described by Dr. J. J. Putnam in the article to which you refer, and which was formerly used by me. The method described in Dr. Putnam's article and quoted in the GAZETTE was so modified by me several years ago as to avoid the objections mentioned.

The method now used is as follows:

The urine is strongly acidulated with nitric acid, and evaporated to dryness upon a water- or steam-bath. If a sufficient amount of nitric acid has been added, the residue left will be of a light yellow color; if it is not, more nitric acid must be added to the residue, and the evaporation continued. When the residue is dry, or nearly so, it may be transferred to a crucible and ignited by gentle heat, or the evaporating-dish containing the residue may be transferred to a sand-bath and heated, when ignition takes place very quickly, with more or less deflagration. If proper care be

taken in managing the heat, there will be no loss of material on account of the deflagration, and a perfectly white residue will be left. After cooling, this residue is extracted with hot dilute HCl, filtered while hot, and the filtrate precipitated with ammonic hydrate and ammonic sulphide; this precipitate is washed by decantation three or four times with boiling water, then acidulated with HCl, to dissolve the phosphates and sulphide of iron, and allowed to stand until the next day to settle. The precipitate, which will contain sulphide of lead, if any lead was present in the urine, is collected upon a small Swedish filter-paper (or other filter free from any trace of iron), washed thoroughly with boiling distilled water, and treated while on the filter with hot *dilute* pure nitric acid, which liquid is collected in a watch-glass, and evaporated to dryness on a water-bath. This residue, which contains any lead present in the form of a basic nitrate, is treated with a drop of water and a crystal of iodide of potassium as a *preliminary* test for lead; if lead is present, there will be a yellow streak of iodide of lead. A colored streak may also be produced if the residue contains compounds of other metals, especially copper, bismuth, or iron (compounds of the last metal sometimes becoming introduced in traces in the form of dust, or as a contamination in the filter). If a colored streak has been produced, the residue containing it is moistened with a drop of acetic acid, and washed with boiling distilled water into a small filter, the filtrate being collected in a test-tube (perfectly clean); a few drops of dilute sulphuric acid are then added, the test-tube stoppered, and placed aside until thoroughly settled. If any lead be present, it will be converted into the form of sulphate of lead, which will form a sediment at the bottom of the test-tube, often in so slight an amount that it cannot be seen until the test-tube is gently moved, so as to cause the fluid within to rotate, when the sulphate of lead precipitate will be drawn up in the centre of the fluid in the form of a cone, when it can be easily seen even when present in very minute amount.

Every precaution, so far as apparatus and chemicals are concerned, is taken. The crucibles used are the Berlin crucibles, and both evaporating-dishes and crucibles have been found, by repeated analyses, not to yield any lead. The final test being the formation of the sulphate of lead, avoids any possibility of error due to the presence of traces of copper or bismuth, which would certainly exist if reliance were placed upon the color reaction with iodide of potassium. In former years, when I did use the iodide test as the final one, these sources of error were recognized, and inquiries made in regard to bismuth having been taken as a drug, and special precautions taken against contamination from copper utensils during the progress of the analysis.

In well-marked cases of chronic lead-poisoning, even while the patient is being treated with iodide of potassium, the amount of lead eliminated with the urine is very small, never exceeding a very few milligrammes in twenty-four hours, and in the majority of cases being only a small fraction of a milligramme. The successful detection of lead in one or two litres of urine in such cases requires, therefore, that the process used should be a very delicate one, and also that it should be conducted with the greatest care. The above method has proved in my hands to be the most delicate one for the detection of traces of lead when mixed with large quantities of organic and other inorganic substances, as in the urine or other animal fluids.

Very respectfully yours,

EDWARD S. WOOD, M.D.,

Professor of Chemistry Harvard Medical School.

BOSTON, January 7, 1888.

CHRONIC LEAD-POISONING.

To the Editors of the THERAPEUTIC GAZETTE:

GENTLEMEN:—The letter from Professor Wood, which I enclose to you, covers most of the points brought up in your interesting editorial on chronic lead-poisoning in the December number of your journal, and I need add only a few words in further explanation.

It is hardly necessary to say that I was unaware that Professor Wood had modified his method since it was given to me at the time of the publication of my first paper on this subject (1883). By far the greater number of the analyses were made, however, after the modifications were introduced. The larger part, including all the later analyses, were done in accordance with Professor Wood's method by Dr. A. M. Comey, who, though of "Harvard University," is not Professor Wood's assistant, but the instructor in chemistry and director of the summer school of chemistry in the undergraduate department at Cambridge. I quote the following from a letter just received from him:

"Some of his (Professor Wood's) improvements have been made since he gave me the method; but, strangely enough, I had myself adopted exactly the same changes. My method now differs from Professor Wood's only in the fact that time seems to me to be an essential feature in the analyses. I let every precipitate settle at least twenty-four hours, and, in some cases, forty-eight hours. The amount of lead is so small that it is possible to lose it unless this precaution is adopted."

I would also say, with reference to the supposition that the crucibles or reagents may have contained lead, that both Professor Wood and Dr. Comey were constantly making analyses in which no lead was found side by side with those where lead was present.

With regard to the possibility of mistaking bismuth for lead, the additional test that Professor Wood recommends for the purpose of avoiding this error has also been used by Dr. Comey, and is described in my second paper, in the *Journal of Nervous and Mental Diseases* of January, 1887; and also in the reprint of the article which forms the subject of your editorial, as it appears in the *Boston Medical and Surgical Journal* of July 28, 1887. How it happened to be omitted in my paper in the *Transactions of the Association of American Physicians* I cannot explain.

With regard to my statement, in the discussion upon my paper, that bottles of *flint glass* were mainly used in the collection of the urine, sometimes without acidulating,—a procedure which you very properly criticised,—I am glad to be able to say that the statement was in itself incorrect, and arose from a too hasty inference on my part. I had been informed by the druggist that bottles such as I used were not made of lead-glass, and jumped at the conclusion that they were made of flint glass, which, however, fortunately, was not the case.

Finally, with regard to the possibility that lead may have had nothing to do with the symptoms in many of the cases in which it was found in the urine, I am well aware that this may be the case, and stated the fact, as I thought, with sufficient emphasis at the opening of my paper. Control experiments with regard to this point would have been made earlier but for the time and expense involved. Dr. Comey has, however, already under way a large series of analyses of the urine of apparently healthy persons, by which I hope that some light will be thrown on this part of the subject.

In conclusion, I would say that since my paper was published lead has been found by Dr. Comey in another case of spastic paraplegia with ataxia, occurring in a young woman; and that the patient described on page 241 of the *Transactions of the Association of Physicians* has died, and the spinal cord has been found to be the seat of diffuse degeneration, especially prominent in the lateral and posterior tracts, both of which are the seat of a dense accumulation of granular cells. The examination is not yet complete.

Very respectfully yours,

JAMES J. PUTNAM, M.D.

January 16, 1888.

THE MEDICAL AND SURGICAL HISTORY OF THE WAR OF THE REBELLION.

To the Editors of the THERAPEUTIC GAZETTE:

GENTLEMEN:—Desirous of obtaining a copy of this work, I addressed a letter to the surgeon-general United States army asking for a copy, and I was informed that the supply was entirely exhausted. And believing that a more generous distribution of this excellent work among the physicians and surgeons of our country would furnish much valuable information, which the profession would feel very grateful to receive, and which would contribute much towards the advancement of the science of medicine and surgery, I take the liberty to ask the medical profession to join in an effort to secure a reprint of this work, which will require a special act of Congress.

I am informed by the surgeon-general that the stereotype plates are still in existence, but that it would be necessary to reproduce the colored plates.

These matters have been fully explained to the Committee on Printing of the last two Congresses, but so far nothing has been done, probably because Congress is not fully aware of the fact that there is such a great demand for another edition of this work. And I would beg leave to request each member of the profession who reads this article to write to the representative in Congress from his district asking him to favor such a bill as will provide for the reprinting of another edition of "The Medical and Surgical History of the War of the Rebellion." Now, if any one has a plan better than the one I have suggested, let his voice be heard.

If exchanges feel interested in this matter, let them publish their views.

Very respectfully,

C. M. FULTON, M.D.

DAWSON, D. T.

GLEDITSCHINE.

To the Editors of the THERAPEUTIC GAZETTE:

GENTLEMEN :—In reference to the subject of gleditschine, whether there is such an alkaloid or not I do not know, but the tear blanket, or "tar-blanket"-tree, as it was called by the Indians and first settlers of Southern Arkansas and parts of Louisiana, is not the *Gleditschia triacanthos*, but belongs to the nat. order *Rutaceæ*, and I think is a species of xanthoxylum. Yours, etc.,

J. F. CLEGG, M.D.

SILOAM SPRINGS, ARK., December 28, 1887.

Notes and Queries.

PERSISTENT VOMITING AFTER LABOR ARRESTED BY TINCTURE OF IODINE.

DR. W. T. DODGE writes as follows to the *Medical Record*, December 24, 1887:

Mrs. M., primipara, small, closely built, was taken in labor the evening of November 6, 1887. I found the head presenting in the L. O. P. position. Labor progressed slowly, the occiput finally rotating into the hollow of the sacrum.

I administered an anæsthetic, applied the forceps, and, after much difficulty, succeeded in delivering the child,—a girl, weighing twelve and one-half pounds. The child was asphyxiated, but artificial respiration restored it in ten minutes. The pregnancy had been normal, excepting a tendency to vomiting throughout its entire duration. The patient was much exhausted at the completion of the labor, but the uterus contracted well. Antiseptic precautions were at once adopted. The labor was followed by atony of the bladder, and I very improperly yielded to her solicitation for chloroform-anæsthesia during catheterization. She was in a most weak and nervous condition, and the suggestion of catheterization without chloroform produced so much excitement, followed by partial collapse, that I yielded to her request; the more readily, as she appeared to bear the anæsthetic very nicely. During the first two days she retained a small quantity of light food, but on the third day her stomach rejected everything. I then refused to give more chloroform, and administered all the usual remedies for allaying vomiting, without avail. During the next two days lactopeptine, dilute hydrocyanic acid, carbolic acid, sublimate, nitrate of bismuth, lime-water, etc., were each given a faithful trial. Then all attempts at nourishment by the stomach were discontinued, and nutritive enemata were given every two hours, combined with hypodermic injections of brandy. Notwithstanding this the nausea and vomiting continued until the evening of the fifth day, when the patient was in a critical condition. Her pulse was 130; temperature, 101° F.; symptoms of impending collapse were apparent. The uterus was firmly contracted, abdomen free from tenderness, and the lochia normal; so I could not diagnose septicæmia. At this juncture I recollected having recently seen an article in the *Medical Record* on vomiting during labor. I looked over the files, and found the article by Dr. Eliot, previously alluded to, recommending tincture of iodine. I repaired to the bedside of my patient; found her retching and vomiting, and completely discouraged. I gave her 5 drops of the tincture of iodine in a tablespoonful of sweetened water. Two hours later I visited her again, when she looked up with a better expression than she had shown since her labor, and exclaimed, "I am hungry." I directed the nurse to give her some milk and lime-water, which she retained. During the night she twice experienced slight nausea, which was immediately relieved by tincture of iodine. She has not vomited, in fact, since the administration of the first dose, and is now making a rapid recovery.

VIGIER'S CORYZA POWDER.

This remedy, which is greatly prized and often prescribed by French physicians, has the following formula, as given by M. VIGIER himself (in the *Gazette Hebdom. de Méd. et Chirurg.*): Finely-powdered starch, boracic acid, tincture of Siam benzoin, of each equal parts. To be used as a snuff, frequently and plentifully. We would remark here that powdered gum benzoin should not be used in lieu of the tincture, as is frequently done by American pharmacists in preparing snuffing-powders. When the gum is used, the resulting powder is tenacious, packs easily, and is difficult to draw into the nostrils. The same may be said of camphor. It is far better to use the tincture and allow the alcohol to evaporate, as in this manner a granular powder is obtained which has not the vice above referred to.—*National Druggist*, January 15, 1888.

LAPPA AS AN EMMENAGOGUE.

Dr. F. M. Stratton, of Metropolis, Ill., writes us that he learned by accident, and has verified by five years' trial in an ordinary practice, that the lappa, concerning which the United States Dispensatory speaks so lightly, is a very valuable medicinal agent. A saturated tincture, in proof spirit, of the seeds, is a most certain, safe, and pleasant emmenagogue. Learning this by accident five years ago, he has used nothing else for suppressio mensium and amenorrhœa since, and it never fails him. All he uses with it is aloes, when he thinks a cathartic action is needed. In dysmenorrhœa, though his experience is yet limited, it has done well. Uterine ailments are not frequent in the range of his practice, and hence he has tested it satisfactorily only in the two conditions first named. The remedy should be widely known, and he feels sure it will be highly appreciated by the profession. Dr. Stratton uses it in drachm doses three times a day, commencing about a week before the expected flow, using aloes at night if such action is needed.

PHENACETIN.

In April last a preliminary note appeared in these columns (vol. xvii. p. 801) on a new antipyretic, to which the names "p-acetphenetidin" and "acetylamidophenol" had been applied. Subsequently (vol. xvii. p. 887) more definite information was given as to the chemical constitution of this compound, from which it appeared to be analogous to antifebrin or acetanilide. The compound, for which the shorter and more convenient name of "phenacetin" has now been chosen, appears to have been since tested therapeutically, and its properties are referred to more in detail (*Pharm. Centralhalle*, November 24, p. 583). It is described as a faintly reddish, odorless, and tasteless powder, which dissolves with difficulty in water, somewhat better in glycerin, but most freely in alcohol, especially if hot. It is insoluble in acid and alkaline liquids, and experiments as to its solubility in the acid juices of the stomach and in pancreas extract have given only negative results. Professor von Bamberger states that phenacetin administered in doses of 0.5 to 0.7 gramme to healthy persons seemed to produce hardly any effect, the influence upon the bodily temperature being barely perceptible. But when administered to fever patients, even in the relatively small doses of 0.3 to 0.4 gramme, it never failed to produce a marked antipyretic effect. In the first tentative experiments doses of only 0.2 to 0.4 gramme were administered, which produced a regular fall of temperature, but this was of slight intensity and short duration. As, however, the safety of the remedy became manifest these doses were increased to 0.6 and 0.7 gramme, which quantity has not been observed to produce any disagreeable or injurious symptoms.—*Pharm. Journ. and Trans.*, December 3, 1887.

ECZEMA OF THE EYELIDS.

In this distressing complaint Lailler (in *Le Monde Pharmaceutique*) recommends the following:

℞ Acetic acid, crystallized, 2 parts;
Glycerin, 50 parts;
Distilled cherry laurel water, 200 parts. M.

Pencil the lids with the preparation once every day. The pencil should be somewhat stiff, and the fluid thoroughly applied.

—*National Druggist*, January 15, 1888.

SENEGIN.

Polygala senega and *Polygala boykinii*—*i.e.*, the northern and southern varieties of senega-root—contain, according to Dr. Joseph Atlass, of Dorpat, about the same proportion of senegin which he found in one specimen of the former, amounting to 1.64 per cent. The other main active constituent, polygalic acid, however, though existing in appreciable quantity in the northern senega-root, especially after it has been kept for some time, is only to be found in traces in the *Polygala boykinii*. In examining the physiological action of senegin, he found that when introduced into the circulation it acted as a violent poison, causing death from asphyxia due to heart-paralysis. No effect was produced when senegin was introduced into the stomach,—partly, perhaps, because it was to some extent vomited, but mainly because it was not absorbed. In animals which cannot vomit no toxic effect was observed. Of course the result might have been different if the gastric mucous membrane had been ulcerated or wounded. Again, the subcutaneous administration did not show the same toxic effects as its intravenous injection, but it produced violent local irritation. Dr. Atlass was unable to discover any therapeutic value in senegin.—*Lancet*, December 24, 1887.

CLINICAL NOTES.

We have received the following clinical notes from DR. J. B. SCOTT, of Scandia, Kansas, which may prove interesting to some of the readers of the GAZETTE:

GENTLEMEN:—For the last three years during the fall and winter months, and, to a mild extent, all the year round, the people of this country have been affected with influenza, some mildly and others quite severely. I have found that the ordinary expectorants are useless in these cases, and never prescribe them, but I have always had good success with the following as a remedy for the terrible cough and accompanying headache:

℞ Ext. yerba santa fl.,
Ext. grindelia robusta, āā ʒi;
Syr. prunus virg., ad ʒiii. M.

Sig.—Teaspoonful every two or three hours. I also prescribe good whiskey and nourishment.

I have had several cases of what seemed to be cystitis, with a good deal of irritation at neck of bladder; constant desire to empty bladder. One, a man 60 years old, had to get out of bed from six to fifteen times some nights. I have prescribed the old formula, known as Lafayette's mixture, with flattering results. It is as follows:

℞ Balsam copaibæ, ʒi;
Liq. potass., ʒii;
Spts. æther. nit., ʒi;
Ext. glycyrrhizæ, ʒss;
Ol. gaulther., ♏xvi;
Syr. acac., ʒvi. M.
Ft. emulsion.

Sig.—Dessertspoonful three or four times a day, after meals and at bedtime.

I have tried antipyrin here lately in three cases of supraorbital headache. Gave 15-grain doses, to be repeated, at intervals of three hours, until relieved. All said they were relieved. I have tried ammonium picrate, combined with the sulphate of quinine, in several cases of obstinate malaria, and think it a good combination. The same cases had taken the quinine right along before, but could not witness much benefit, but when I added half a grain of the ammonium picrate they made marked progress towards recovery.

I have been using the salicylate of ammonium in several cases of fevers, and am going to make a more extended trial of it. I think it a valuable salt, as the cases of typhoid in which I used it got up quicker, and the fever was under much better control. I gave it in 5-grain capsules, four of them daily.

I have, to all outward appearances, cured two obstinate cases of acne implicating the face, and one of them the scalp.

In one case the disease affected both eyelids; large, hard enlargements, much resembling boils, being there and on back of neck. They formed as large as quail's eggs. They would not suppurate like boils, but the pus or matter inside would dry up and leave a hard lump. I gave them this treatment with good results:

℞ Spts. saponis alkalinis, ʒii.

The formula for making the above is—

℞ Saponis viridis, ʒiii;
Spts. vini rect., ʒi;
Filtra, et adde
Spir. lavandul., ʒii. M.
Ft. lotion.

Sig.—Rub on a drachm or two of this each night before retiring; then let remain ten or fifteen minutes, when it should be washed off with hot water, and the washing should be continued for twenty or thirty minutes, when the following should be applied, and let remain until morning, when it can be washed off with warm water:

Sulph. sublimat., ʒiv;
Spts. camphori, ʒii;
Gum. acac. pulv., ʒii;
Aq. calcis,
Aq. rosa, āā ʒii. M.
Ft. lotion.

Sig.—Apply as before stated.

In one of these cases I found constipation, which I corrected by 8-drop doses of fl. ext. nux vomica three times a day. In the other case the kidneys were not acting very well, and I gave—

Ext. queen of meadow,
Ext. corn-silk, āā ʒi;
Bromide of lithium,
Acetate of potash, āā ʒiii;
Simple elixir,
Water, āā ad q. s. ʒiv. M.

Sig.—Teaspoonful four or six times a day.

J. B. SCOTT, M.D.

SCANDIA, KAN., November 15, 1887.

TREATMENT OF GONORRHŒA WITH IODOFORM.

DR. PAUL THIÉRY, in the *Progrès Méd.*, recommends injections of finely-powdered iodoform suspended in sweet-almond oil in gonorrhœa. He cites six cases which were cured in less than two weeks with about seventeen injections. Aside from its antiseptic properties, the injections of iodoform greatly relieved the pain of the disease.

MYROBALANUS.

Myrobalanus, the fruit of several species of *Terminalia*,—an ancient remedy for intestinal affections, though long since disused in European countries,—is receiving some attention of late on account of articles concerning it published in the *Union Pharm.*, September, October, 1887, by Dr. Apéry, of Constantinople. He calls it "an heroic remedy against diarrhœa," and tells us that Dr. Ahmed Pacha prescribes it with great success. The pharmacists of the East sell it in large quantities under the name of Karahalilé, or Indicher. The doctor's investigations were made upon *M. nigræ* s. *indicæ*, that variety being "the most energetic, and having the greatest vogue." He found no alkaloid, but ascertained the presence of a green, oleo-resinous substance, which he believes to have an influence upon digestion and bile-secretion. This, together with tannin, which acts upon the intestines, leads the doctor to place the substance among the nutritive tonics and stimulants. A large number of doctors, who were led by him to test the substance, found it very effective in acute diarrhœas of the aged and in infants, as also in intestinal catarrh in tubercular patients. They also found it efficacious in hemorrhages, hemorrhoids, and albuminuria. The doctor believes it to be the best remedy now used in the dysenteries and acute and chronic choleriform diarrhœas which decimate the people of the Orient. The dose is from 4 to 12 pills, whose size is not given. However useful myrobalanus may yet become as a medicine, it contains so enormous a quantity of tannin that a practical man reading these articles would be inclined to predict for it a still more brilliant success in the manufacture of writing-fluids. Indeed, the investigator remarks, "It also makes a beautiful black ink, more staple than that from nut-galls."

THERAPEUTIC VALUE OF THE WHITE ARCHANGEL NETTLE.

M. Florain claims that the white nettle (*Lamium album*) has a hæmostatic value quite equal to either the great or little nettle (*Urtica dioica, Urtica minor*), and that when used in the form of a tincture, internally, its effects are rapid and very marked. He prefers the following formula:

℞ Tincture of lamium alb., ℥v;
Simple syrup, ℥iiss;
Water, ℥ss. M.

The dose for an adult is 1 tablespoonful every half-hour until the hemorrhage ceases.

The author says that the hæmostatic effects of the remedy are due to an alkaloid, which he has isolated and named lamine. The sulphate or hydrochlorate of lamine is soluble in water, and when injected hypodermically produces rapid hæmostasis. He does not indicate the dose.—*National Druggist*, January 15, 1888.

INJECTION OF LIME-JUICE IN EPISTAXIS.

The remedies for epistaxis are numerous and varied, but many of them are not as efficacious as might be wished. Perchloride of iron and ergot have been the remedies principally employed. Dr. Geneuil writes to the *Bulletin Général de Thérapeutique* of November 30, 1887, of a novel way in which he has been treating this ailment. He employs injections of fresh lime- or lemon-juice. For this purpose he uses a small glass urethral syringe, and uses its entire contents for one injection. In about two minutes the blood ceases to flow. Should this, however, not be the case a second injection may be given, but one is almost invariably sufficient. Dr. Geneuil does not think that this action is due to the presence of citric acid in the lime-juice, as injections of that acid failed to produce similar results in two cases where a single injection of lime-juice acted immediately.

FABIANA IMBRICATA.

As a result of a chemical examination of the herbaceous stalks of *Fabiana imbricata*, the Chilian drug which, under the name of "pichi," was not long ago introduced as a remedy in urinary disorders, Messrs. Nivière and Liotard report (*Journ. Pharm. Chim.*, November, p. 389) that they have been unable to find any trace of the alkaloid to which the name fabianine has been proposed (*Pharm. Journ.*, 3, xvi. 722). They are inclined to attribute any therapeutic property the drug may possess to a fluorescent, glucosidal principle resembling æsculin.—*Pharm. Journ. and Trans.*, December 3, 1887.

A LIBERAL GIFT.

The anatomist R. Quain, who recently died in London, left nearly his entire fortune—seventy-five thousand pounds—to the University College, to be devoted to the furtherance of the study of modern languages and natural sciences.